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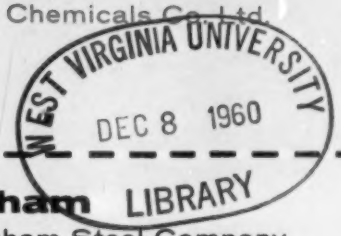

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Pg*

MEANS CHEAPER HAULAGE —LONGER SHIFTS

with the first and only 'Double-Sleeve' Long-Life Battery

Until now, many mines have been unable to take full advantage of battery-electric haulage. Today, since the introduction of the greatly advanced Oldham 'Pg' battery, they have gained the double benefit of cheaper haulage and longer battery shifts.

Greater Capacity. Where an ordinary battery is incapable of lasting the necessary period, the exceptionally efficient power/weight ratio of the Oldham 'Pg' battery enables it to work a complete shift without tiring and often continue beyond if required. This greater capacity is due to the much bigger quantity of active material packed into the 'Pg' plate.

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'Pg' Cap Lamp Battery. The advantages of 'Pg' have been applied to the 'Oldham 'Cap Lamp. In addition to improved efficiency and longer life, 'Pg' means *safer* working, as it gives the wearer brighter light at the end of the shift, when accidents are more likely to occur through fatigue.

'I told 'em—OLDHAM'

OLDHAM

Pg TRACTION BATTERIES

***'Pg' also means PLASTIC-plus-GLASS, the first and only 'Double-Sleeve' tubular battery plate.**

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At this plant near Kimberley, to produce one lb. of diamonds about 11,000 tons of blue clay have to be worked. Every day, with faultless regularity, thousands of tons of tailings must be carried away. They travel with certainty on M&C conveyors, which are kept efficient by the idlers. These idlers, used for belt conveyors the world over, spin at a touch. They go on keeping out dust, mud, and rain, because they are ***sealed for long life.***

←One of the many M&C conveyors taking the diamond tailings from a central plant to a thrower.

MAVOR & COULSON LTD

Bridgeton Glasgow S.E.
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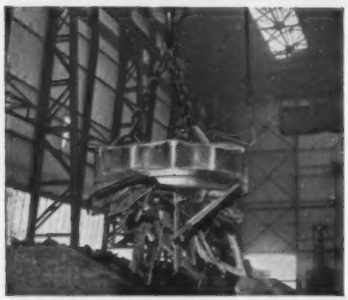
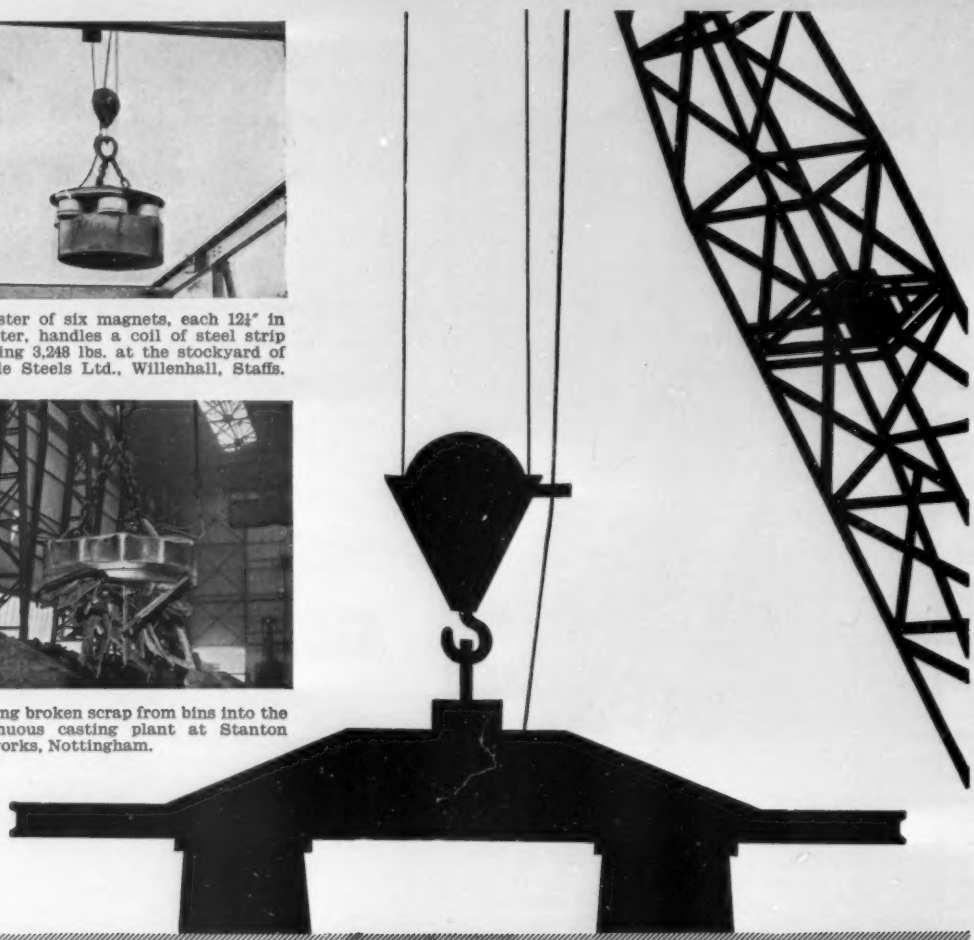
36 Victoria Street London S.W.1.

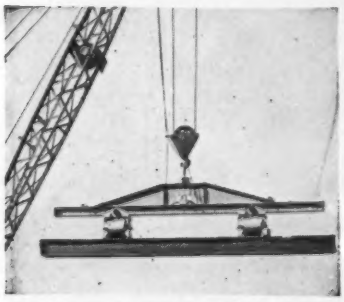
A cluster of six magnets, each 12½" in diameter, handles a coil of steel strip weighing 3,248 lbs. at the stockyard of Ductile Steels Ltd., Willenhall, Staffs.



Loading broken scrap from bins into the continuous casting plant at Stanton Ironworks, Nottingham.



WITTON-KRAMER LIFTING MAGNETS FOR EVERY JOB



Two bi-polar magnets on spreader beam lifting rolled steel joist.

Whether handling hot steel billets and ingots or salvaging metal from under water, Witton-Kramer electric magnets do the job superbly. Circular, rectangular or bi-polar, G.E.C. makes them all with coils designed and constructed to withstand heavy duty and shock loads. All Witton-Kramer magnets are easily maintained and quickly serviced.

RELY ON THE EXPERIENCE OF G.E.C.

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388

24

different types of fixing device for Speed and Strength

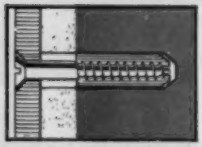
Cut your costs with

RAWLPLUG FIXING DEVICES

FOR SPEEDY FIXING IN ANY MATERIAL

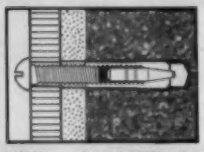
No more trouble or costly delay because the material was 'difficult'! Whether it's concrete or plastic, breeze or sheet metal, cavity brick or lath and plaster, there's a Rawlplug Fixing Device that makes firm screw or bolt fixings quickly, easily and economically. The speedy answer to every fixing problem is one or other of the 24 different types of Rawlplug Fixing Devices.
Write for illustrated brochure.

Screw Fixings



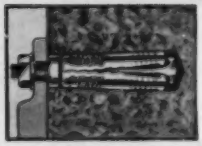
Use the famous RAWLPLUG for neat, firm fixings in brick, stone, etc. All sizes up to ½" diameter Coach Screws. Rawlplugs are waterproof and unaffected by climatic conditions.

Rawlplug WHITE BRONZE PLUGS are specially suitable when the fixing is subject to very high temperatures, such as the outer brick coverings of furnaces. Use also for under-water fixtures.



NEW! RAWLSETS, for ⅜" and ⅞" Whit. screws, are metal shell sockets which grip by expansion. Ideal for fixing signs, stoves, metal windows, fluorescent light fittings, etc. Write for leaflet.

Bolt Fixings



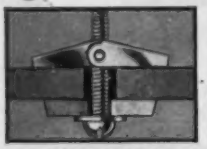
For bolting heavy equipment use RAWLBOLTS, a *dry* fixing that grips by expansion. No cold chiselling, no waiting for concrete to harden. Sizes up to 1" bolt diameter.

Use Rawlplug BOLT ANCHORS for bolting down in extremely wet or corrosive situations. Caulking completely seals the anchorage. Use also for anchoring Diesel Generators, Power Hammers, etc.

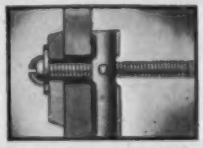
Rawlplug CEMENT-IN-SOCKETS are positioned before concrete is poured, eliminating hole-boring. They provide strong, permanent fixings wherever bolt locations can be pre-determined. For bolt diameters ¼" to 1"

Cavity Fixings

Screwed up from the front the amazing RAWLNUT forms its own rivet head behind the material—air-tight, watertight, vibration-proof, squeak-proof! For all thin or hollow materials.



For ceilings of lath and plaster, plasterboard, etc., use Rawlplug SPRING TOGGLES. The inserted Toggle springs open behind the material, spreading the load over a wide area.



Rawlplug GRAVITY TOGGLES are ideal for hollow materials from ⅞" thick. Inserted horizontally, the long end falls into correct position by gravity. The screw is then tightened in normal way. For ½", ⅞" and ¾" Whit. Screws.

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MINES FIRE—DUST SUPPRESSION & WATER INFUSION EQUIPMENT

THE LINDLEY "EASY TURN" H.P. STOP VALVE

PROV. PAT. No. 18303/57

Stainless Steel Spindle seat and disc (removable). Easy operation at high pressure. Robust construction throughout. Working pressure 1,500 lb. p.s.i.

THE LINDLEY (Pre-adjustable) H.P. FIRE HYDRANT TYPE 53

PATENT Nos. 698,053 AND 781,753

The valve body carries two outlets direct from the range, thereby giving a supply of water at full pressure, at all times, without manipulation of the hand wheel. These h.p. outlets are tapped ¾ in. in B.S.P.T. for fitting a Lindley Minor Valve. By this means control of the supply of water is obtained.

Working pressure 1,500 lb. p.s.i. Stainless Steel Spindle, seat and disc (removable).

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PATENT No. 783,330

Two outlets direct from the main. Three outlets at variable reduced pressures. Inlet pressure from 1,550 lb. p.s.i. Outlet pressure can be reduced to 10 lb. p.s.i. All internal parts in Stainless Steel.

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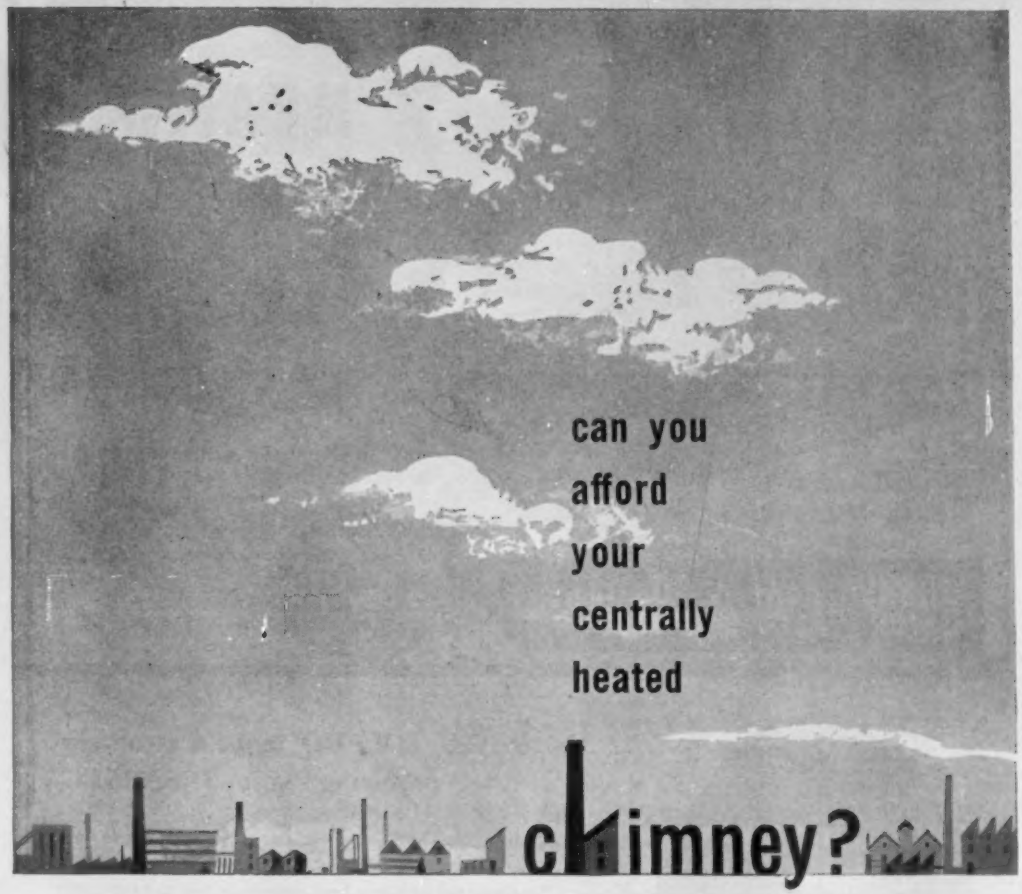

With rising production costs it's hardly likely. The people to see are Spencer-Bonecourt-Clarkson who for over forty years have been experts in waste heat recovery for steam raising in a wide range of industries. In addition to fire-tube boilers, *S-B-C now also supply water-tube boilers.*

The vigorous approach of S-B-C technicians leads them into many fields of enquiry. They are experts on latent cooling techniques as applied to door frames and other parts of open hearth furnaces, and to the skids of reheating furnaces. Keeping abreast of the latest developments in the Steel and other industries, a team of S-B-C engineers recently toured Germany and other continental countries to inspect the newest techniques.

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HEAP'S PATENT AUTOMATIC SCREWING MACHINES

WITH ROTARY TANGENTIAL DIE HEADS

These machines have been especially designed for quantity production work, and they are capable of extremely fast rates of output. Outstanding features include Tangential Die Head, Hand and Automatic Releasing Motion, Automatic Closing Device, Automatic Pump, etc.

A full range of sizes are available

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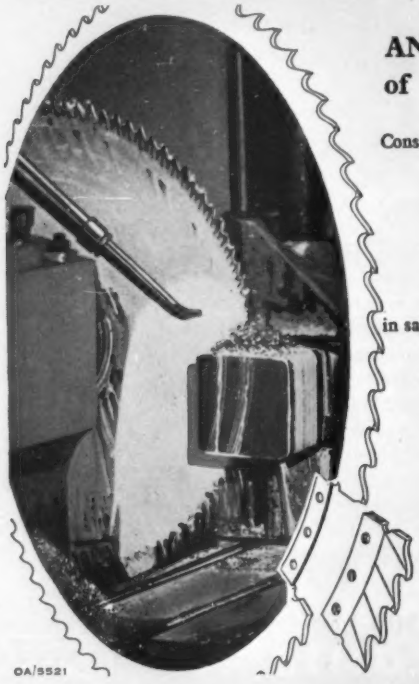

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ANDREWS TOLEDO make a clean-cut of cutting problems with SPEARSEG

Consistently to meet the exacting demands of Andrews Toledo Ltd., of Sheffield is a feather in the cap for any supplier. For Spearseg saws have long been extensively used as components in the modern equipment of this important steel group. By long usage, Andrews Toledo recognise the superiority of Spearsegs and the efficient maintenance service that goes with them . . . . the "know-how" of 200 years experience in sawmaking. If you have a cold-cutting problem, get in touch with the Departmental Manager. Phone Sheffield 20202. He's ready to help you with expert advice.

FREE: *A speed calculator for all types of cold-cutting work.*

Spearseg **SEGMENTAL SAWS**

Made by the world's oldest and most experienced sawmakers.

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HEAVY DIAMOND TYPE

CONVEYOR BELTING FOR MAIN GATES & TRUNKS

NOTE THESE IMPORTANT ADVANTAGES:

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FOR THE ROUGH TOUGH JOBS

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BREAKING LOAD MINIMUM PER INCH WIDTH	2000 LB	2500 LB	3000 LB	4000 LB
THICKNESS	8 mm	8 mm	8 mm	9 mm

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Efficiency over 98%

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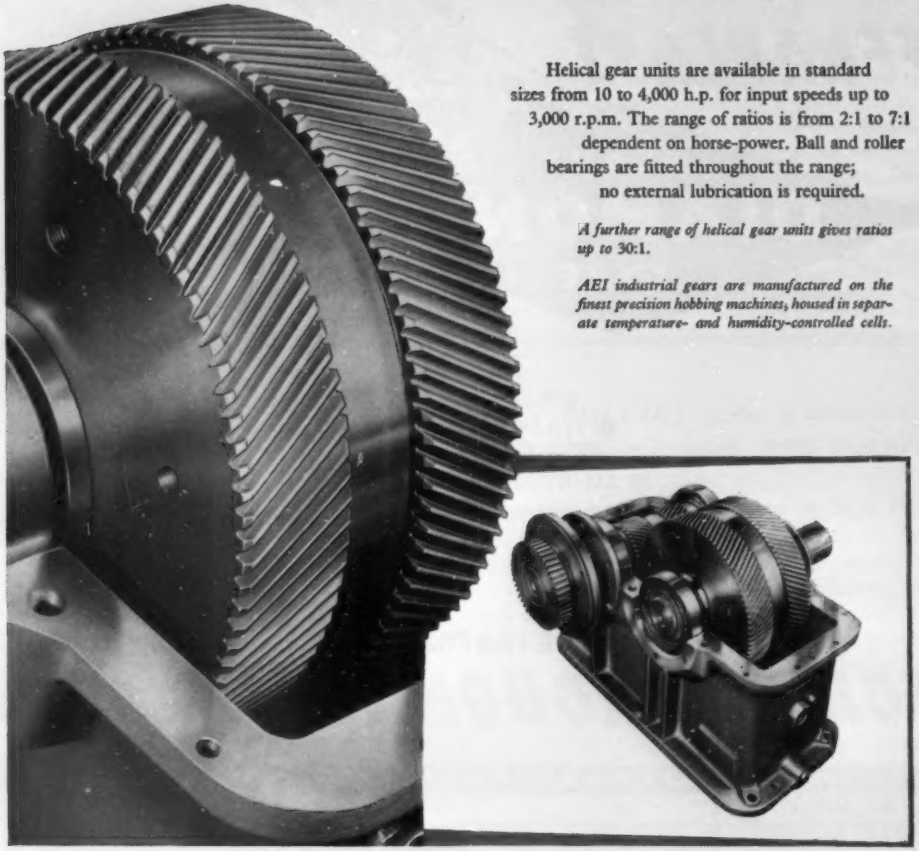
STANDARD INDUSTRIAL GEARBOXES



Helical gear units are available in standard sizes from 10 to 4,000 h.p. for input speeds up to 3,000 r.p.m. The range of ratios is from 2:1 to 7:1 dependent on horse-power. Ball and roller bearings are fitted throughout the range; no external lubrication is required.

A further range of helical gear units gives ratios up to 30:1.

AEI industrial gears are manufactured on the finest precision hobbing machines, housed in separate temperature- and humidity-controlled cells.

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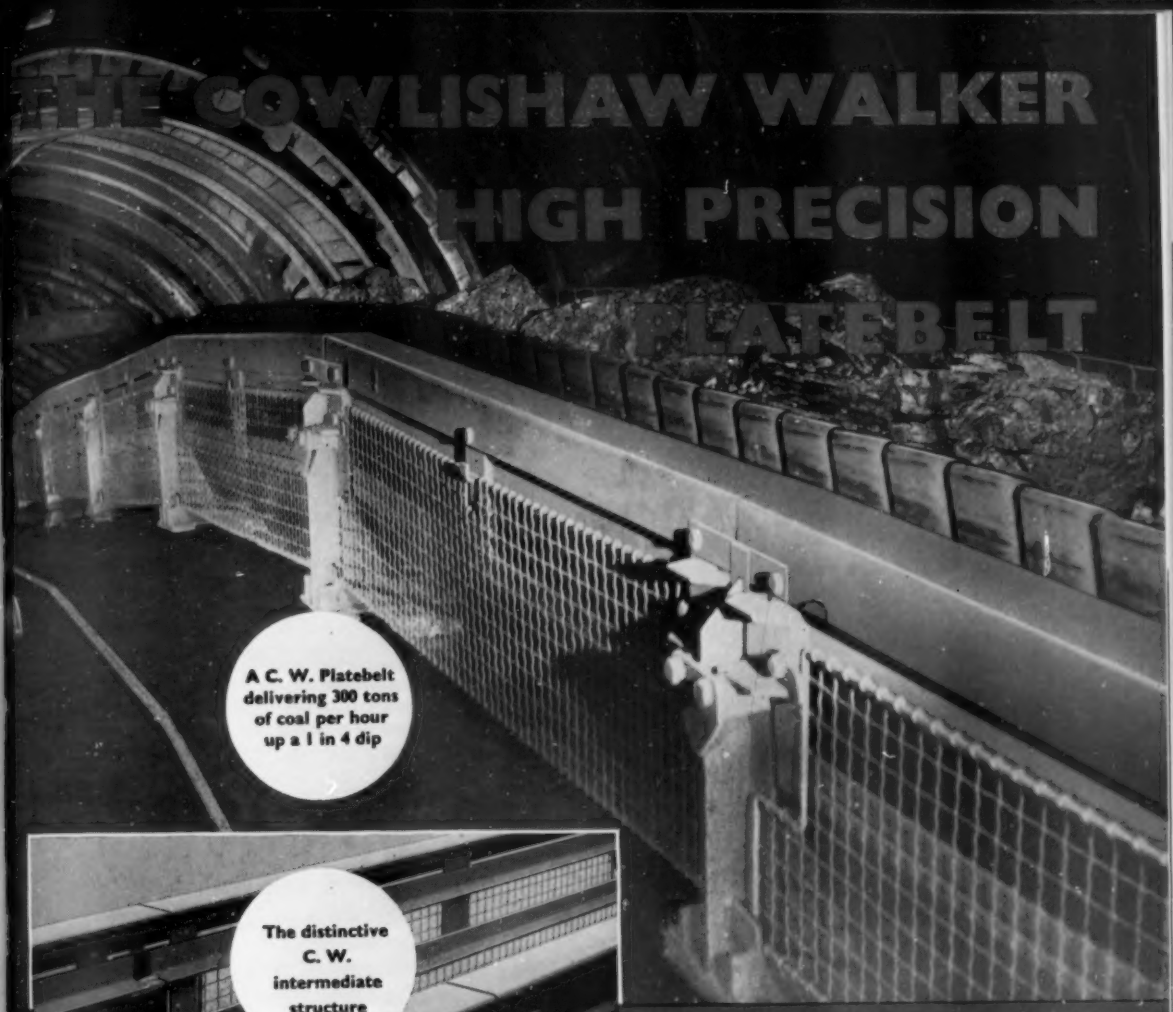
THE COWLISHAW WALKER HIGH PRECISION PLATEBELT



A C. W. Platebelt delivering 300 tons of coal per hour up a 1 in 4 dip

The distinctive C. W. intermediate structure

This unique all British platebelt incorporates the inbuilt reliability and distinctive design features which the mining man always associates with the name "Cowlishaw Walker."

The patented intermediate structure is particularly easy to assemble yet is extremely rigid and robust when locked in position.

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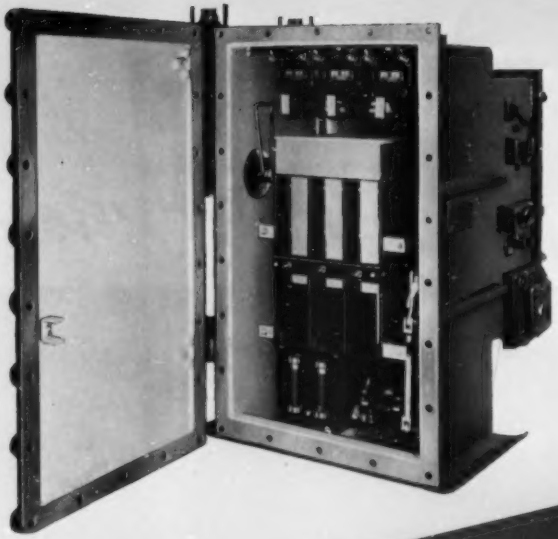

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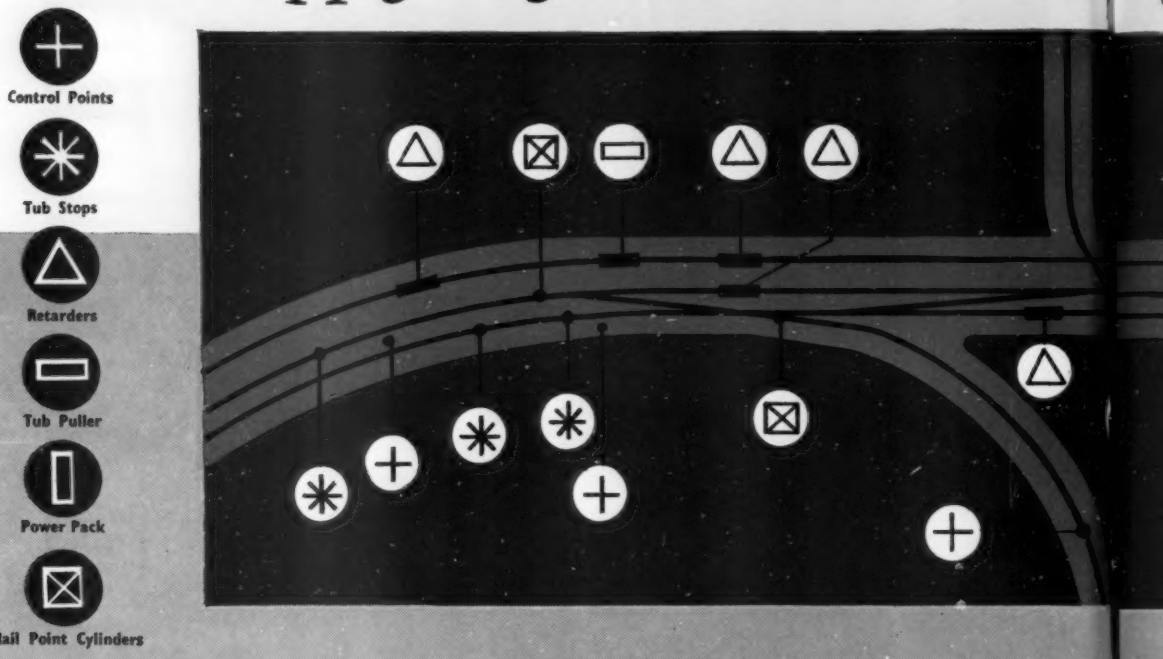
Complete MINE CAR HANDLING PLANT

AT FRICKLEY COLLIERY

Apply Hydraulics-Increase E



This diagrammatic arrangement of the mine car handling system at Frickley Colliery is a typical Sutcliffe installation designed and engineered to provide a safe and simple system of control. When considering a new scheme, a reconstruction or re-organisation or just a single unit, do not overlook the tremendous advantages of hydraulic equipment. Savings in manpower of up to 80% have been recorded; the system is self-lubricating and conversion of compressed air systems results in a substantial saving in horsepower.

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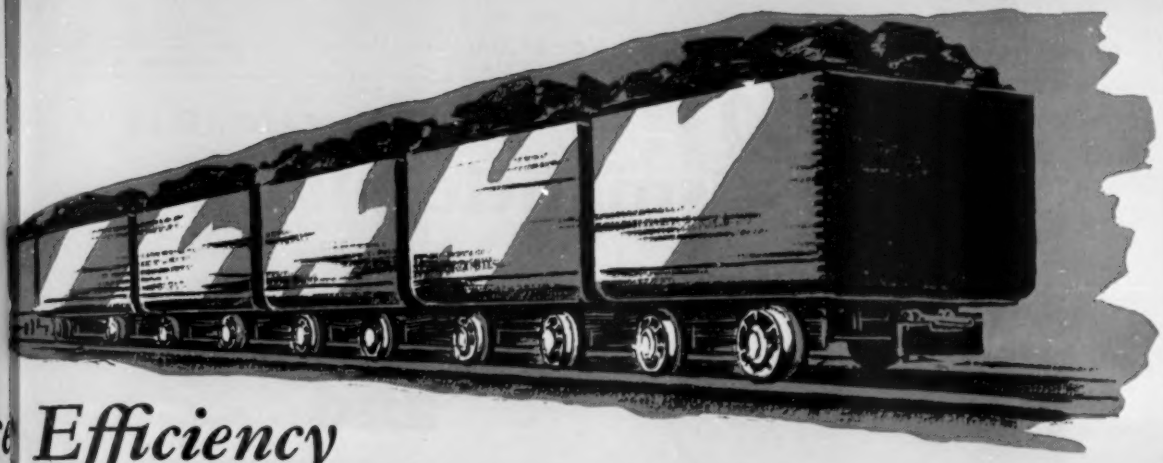

Efficiency

Sutcliffe

Diagram by courtesy of No. 4 Area, N.E. Division, National Coal Board.

Sutcliffe equipment takes care of your coal

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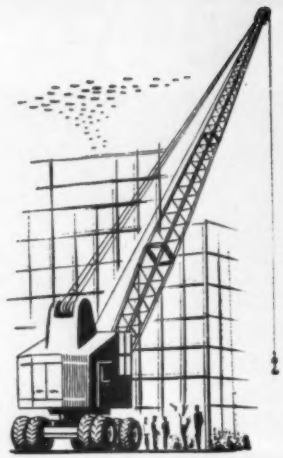

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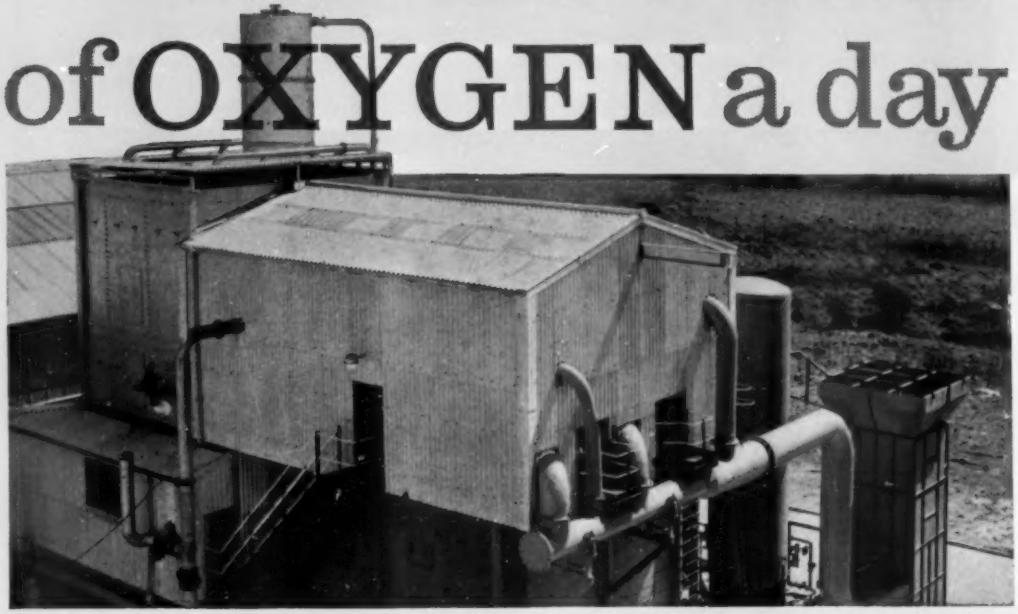
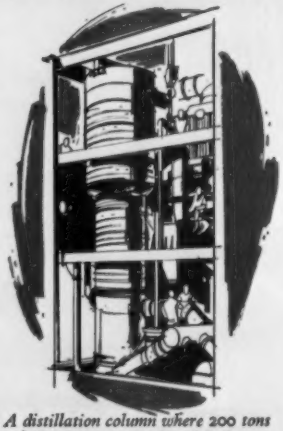


. . . and BOC made the air separation plant

To produce more and better steel at Margam, The Steel Company of Wales Ltd. uses 300 tons a day of high purity oxygen. Further air separation plant now being installed will bring oxygen production up to 700 tons a day. All the units were designed and constructed by The British Oxygen Company Ltd. Today over 90% of the oxygen used by the British steel industry is produced in plant designed and constructed by BOC. If you need oxygen, nitrogen or other atmospheric gases it will pay you to consult The British Oxygen Company Ltd. at the project stage. They offer impartial advice on the economics of alternative sources of supply, by pipeline, storage on site or plant installation.

When plant installation is decided on, BOC offer the following service:

- Pre-sales consultation through all stages of plant design, construction and commissioning.
- Staff training in plant operation and maintenance.
- After-sales service and collaboration.



A distillation column where 200 tons of oxygen are produced daily.

For air separation plant – first consult

BOC, *in addition to providing gas supplies, make complete air separation installations for oxygen, nitrogen and rare gases. Transportable oxygen plants. Gas purification systems. Low temperature engineering plant. They also supply liquid oxygen pumps and vaporisers. Gas compressors. Gas and liquid storage systems.*

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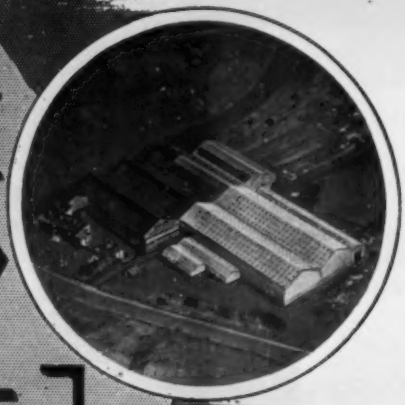

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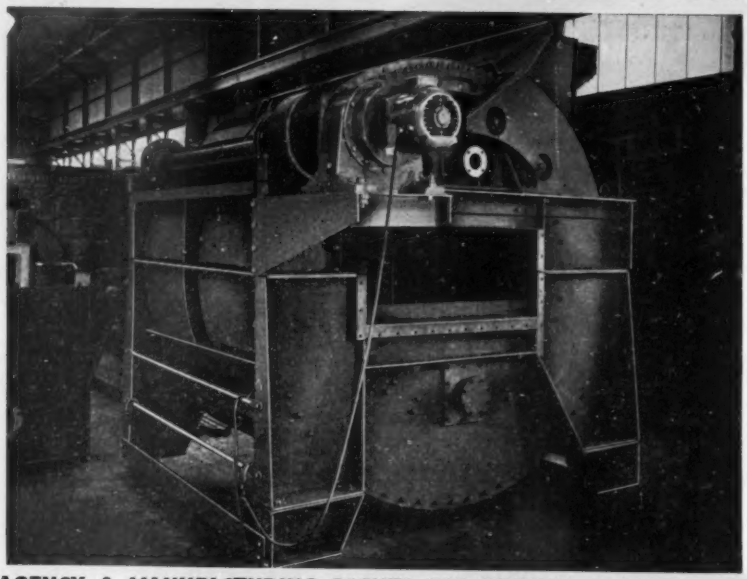

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C. L. TAYLOR, M.I.Mech.E., "Woodford," 13, The Parade, Whitchurch, Cardiff.
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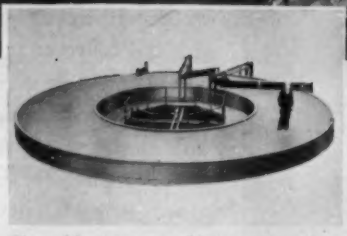
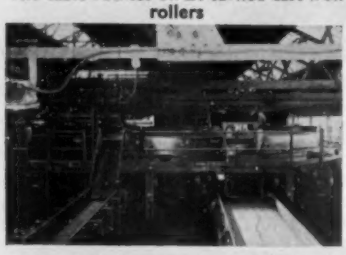
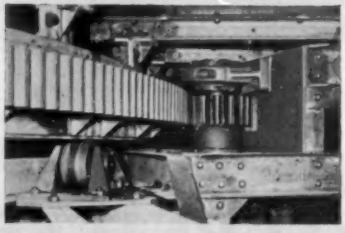
Messrs. JAMES C. HUNTER & CO., 47a, Victoria Street, Sheffield 3. Telephone: Sheffield 27041.



The table rotates on 24 turned cast iron rollers



Separate belts convey the graded coal



The driving gear is built up from 16 identical cast steel segments.

For the production of large coal, the Rotary Sorting Table has the following advantages over the old picking belts:-

(a) Reduction of degradation by eliminating cross belts and complicated transfer points.

(b) Considerable saving in manpower.

(c) Sorting is simplified by the use of rakes (see photograph above).

(d) Ease of supervision. The operators form a compact group on the inside and round the periphery of the table.

The improved drive (patent applied for) incorporated in the Rigley Table has reduced maintenance to an absolute minimum. One of our tables has been in continuous operation for over three years and handled over two million tons of coal without breakdown or major renewal.

Our Engineers will be pleased to advise on the size and type of table to meet your requirements.

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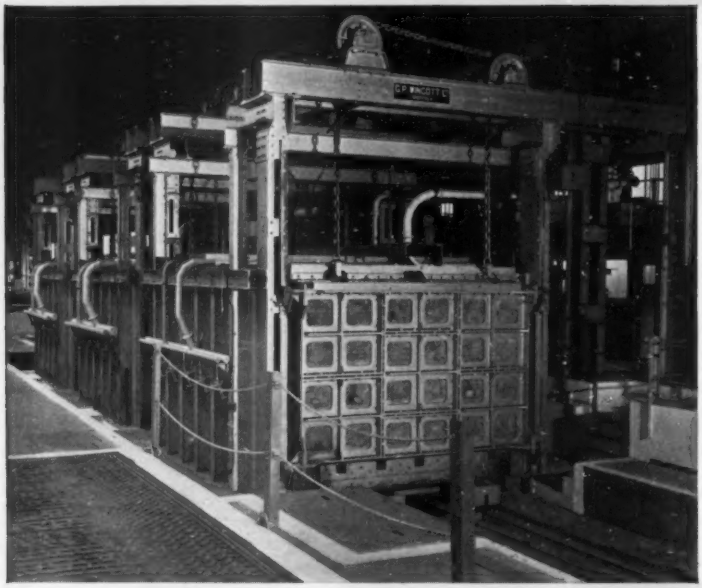
Cut fuel and labour costs in your **Steel Foundry** and achieve continuity of production by installing a **Triple Chamber Quenching Furnace**



By permission of Messrs. Edgar Allen & Co. Ltd.

The three separate chambers of this City Gas Fired Furnace are 12′ 0″ long × 10′ 0″ in effective width. They are each equipped with two electrically operated self-locking doors and operate as independent units.

The castings are preheated from cold to 300°C. in the first chamber and then pass to the second chamber where they are raised to 750°C. They are finally heated to 1100°C. in the third chamber and after soaking are quickly withdrawn by an extractor gear and conveyed to the oil or water tanks for quenching. The chambers are equipped with instruments for the automatic control of temperature, air/gas ratio and pressure. Prescribed heating curves can easily be maintained.

By utilising the third chamber as a cooling chamber the furnace can be employed for annealing purposes. When desired the first and third chambers can be independently used for the batch treatment of castings.

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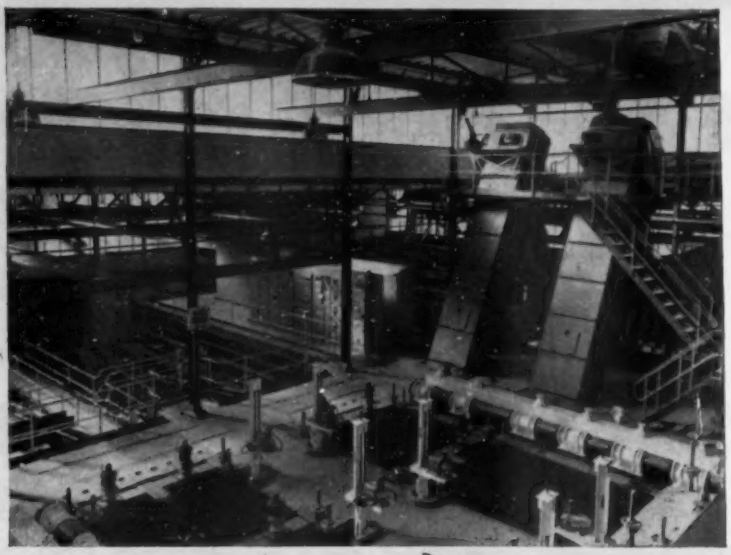
The top floor of the new 500 t.p.h. Baum plant built for the National Coal Board at Killoch Colliery. Photograph by kind permission of National Coal Board.



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Taking a sample of the dense medium in the Simon-Carves dense medium pilot plant.

The success of the current modernisation policy demands that installations serving the new high-output mine shall be of the highest technical, mechanical and structural quality. This is particularly true of the coal preparation plant, for breakdown or inefficiency there cannot be tolerated if outputs are to be maintained. In the Simon-Carves research and development plant, a large staff of scientists and engineers is constantly proving new developments in coal preparation technique. Only facilities such as these, backed by fifty years' experience of the business, can provide the vital mastery of the art of coal preparation so necessary to modern mining economy. Facilities like these mean plants like this.

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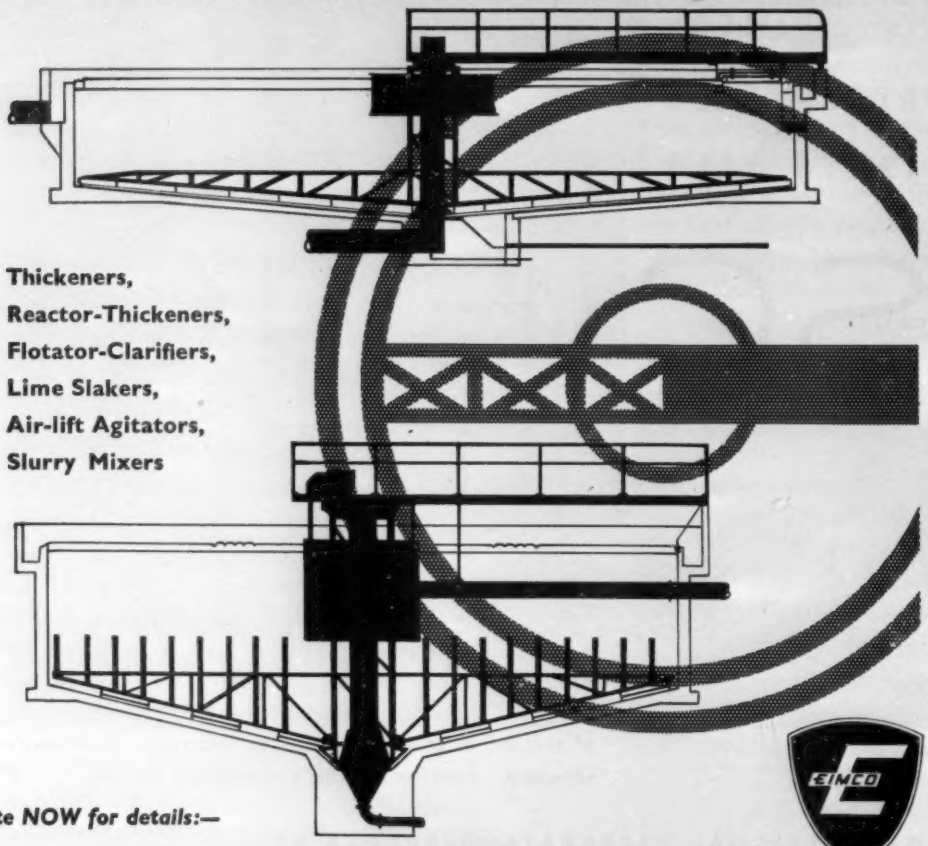

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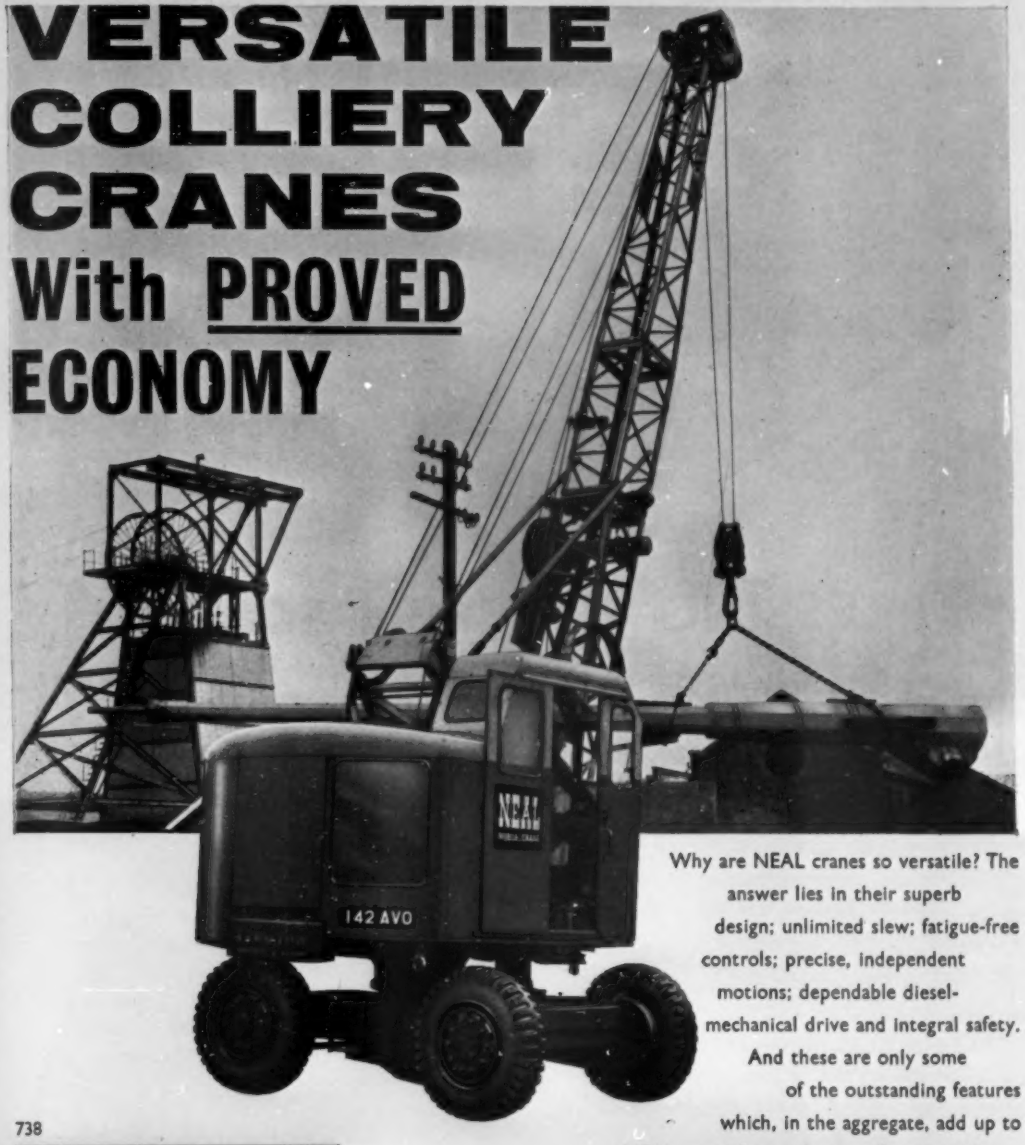

Why are NEAL cranes so versatile? The answer lies in their superb design; unlimited slew; fatigue-free controls; precise, independent motions; dependable diesel-mechanical drive and integral safety. And these are only some of the outstanding features which, in the aggregate, add up to NEAL versatility with **proved** economy!

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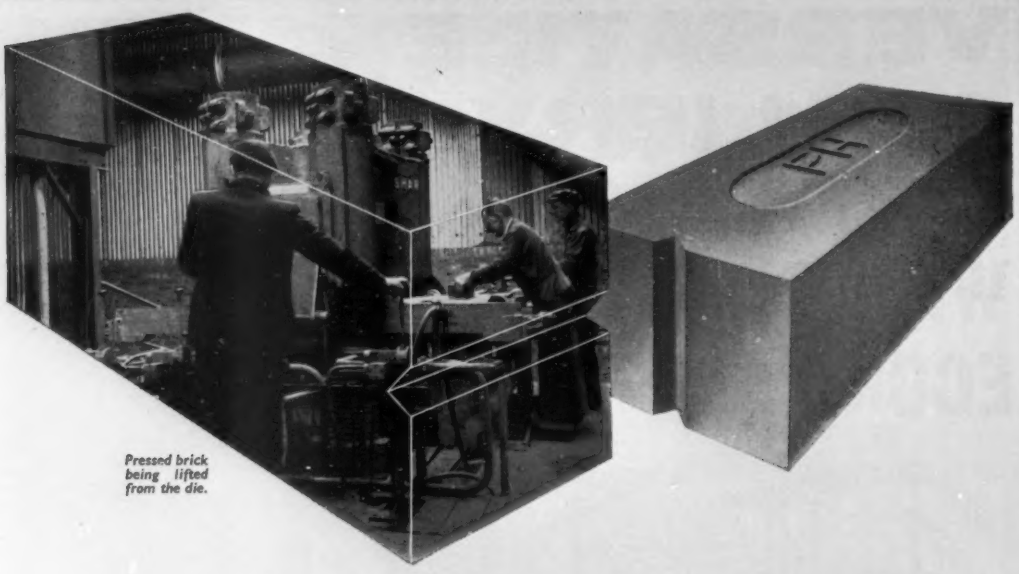

Pressed brick being lifted from the die.

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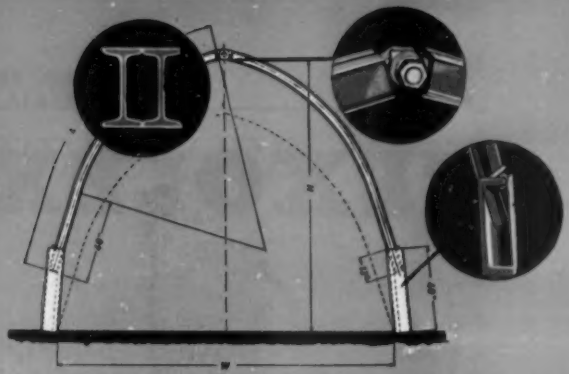

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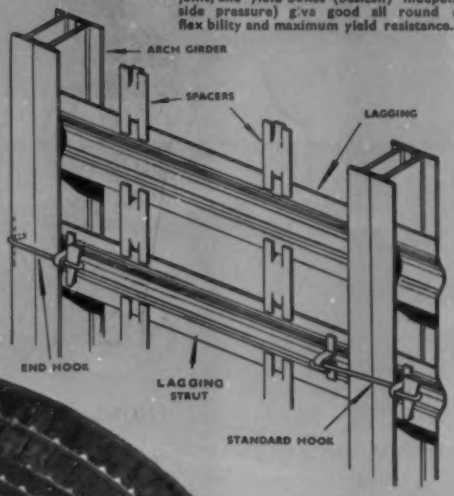

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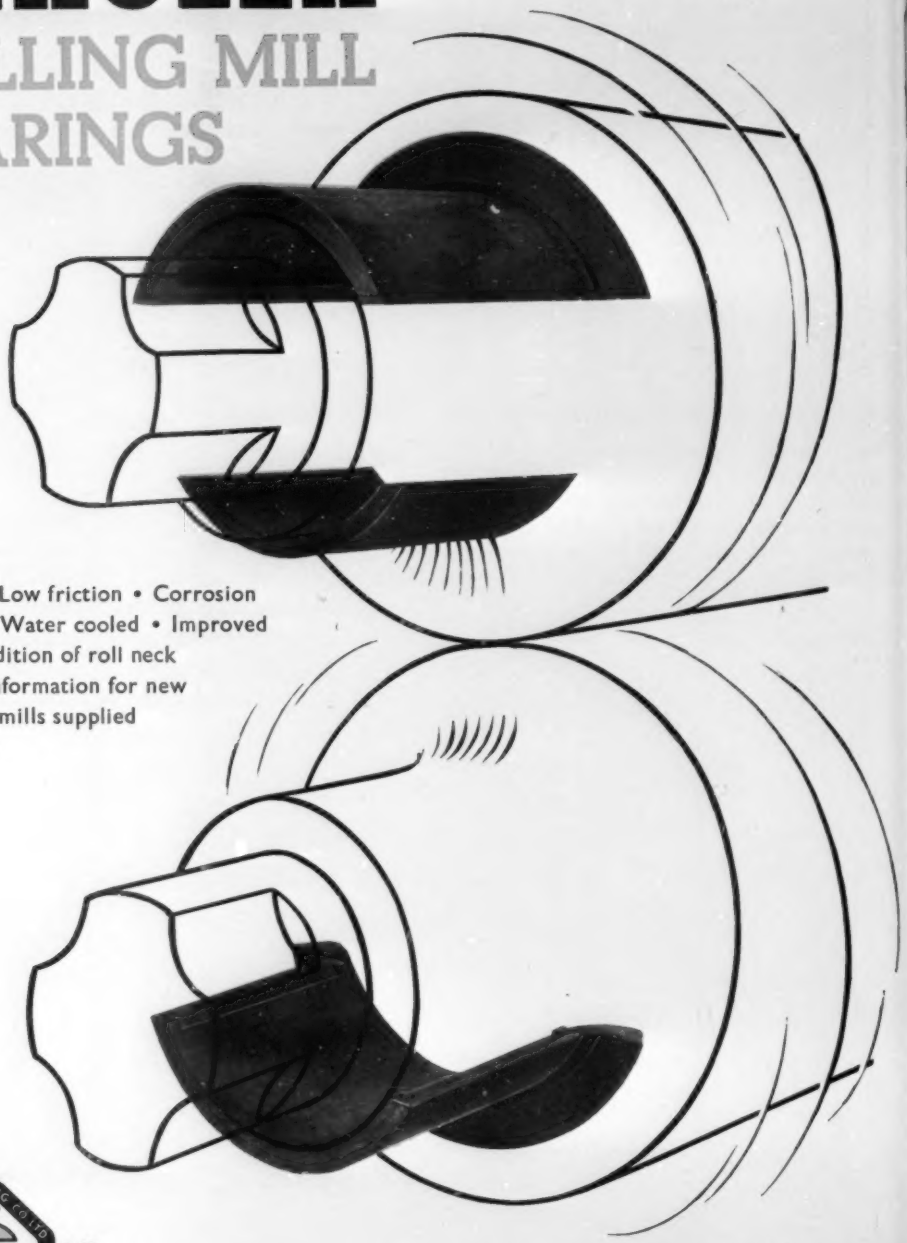

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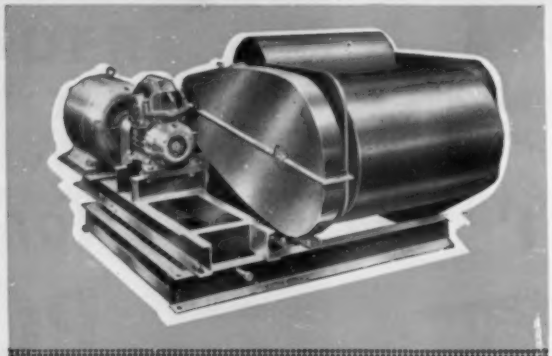

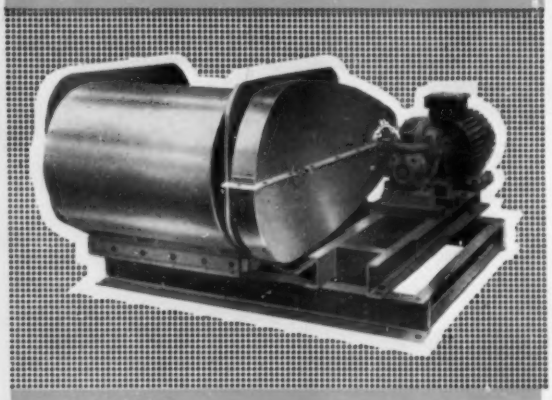

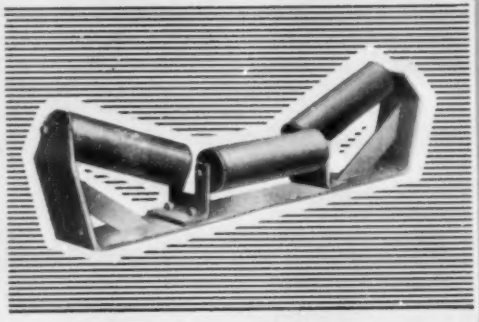

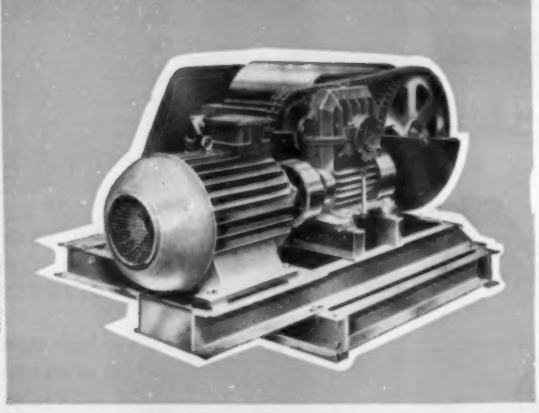

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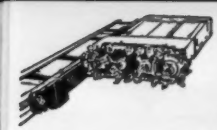

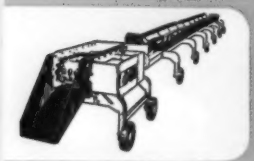

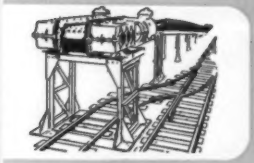

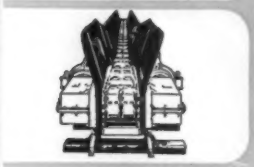

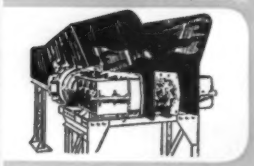

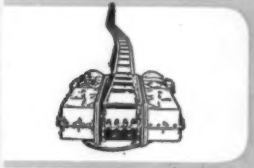

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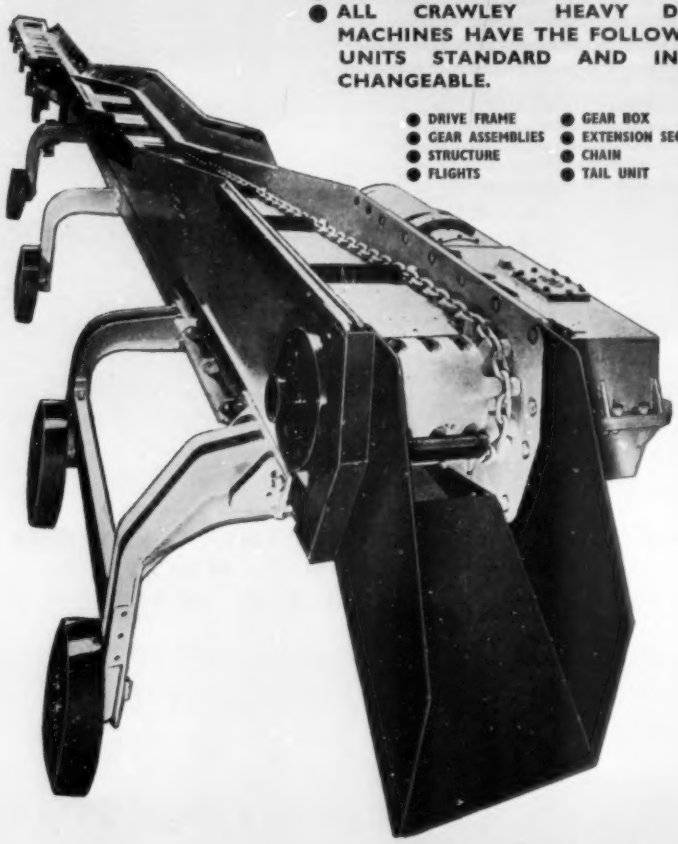

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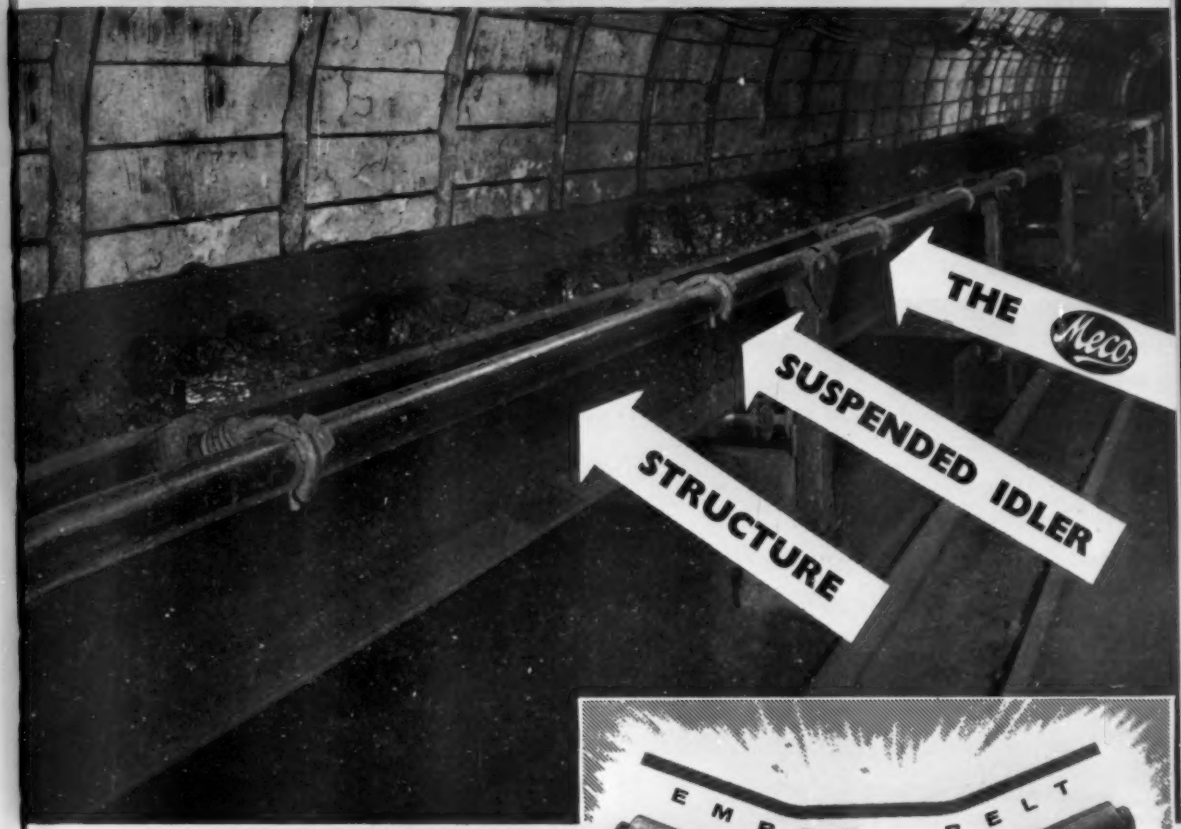

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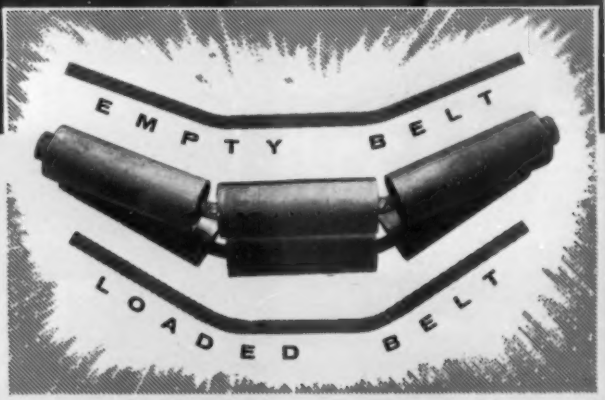

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DAVY-UNITED

at Appleby-Frodingham

45" x 114" reversing slabbing mill. Photograph by courtesy of Appleby-Frodingham Steel Company (Branch of The United Steel Companies Limited).

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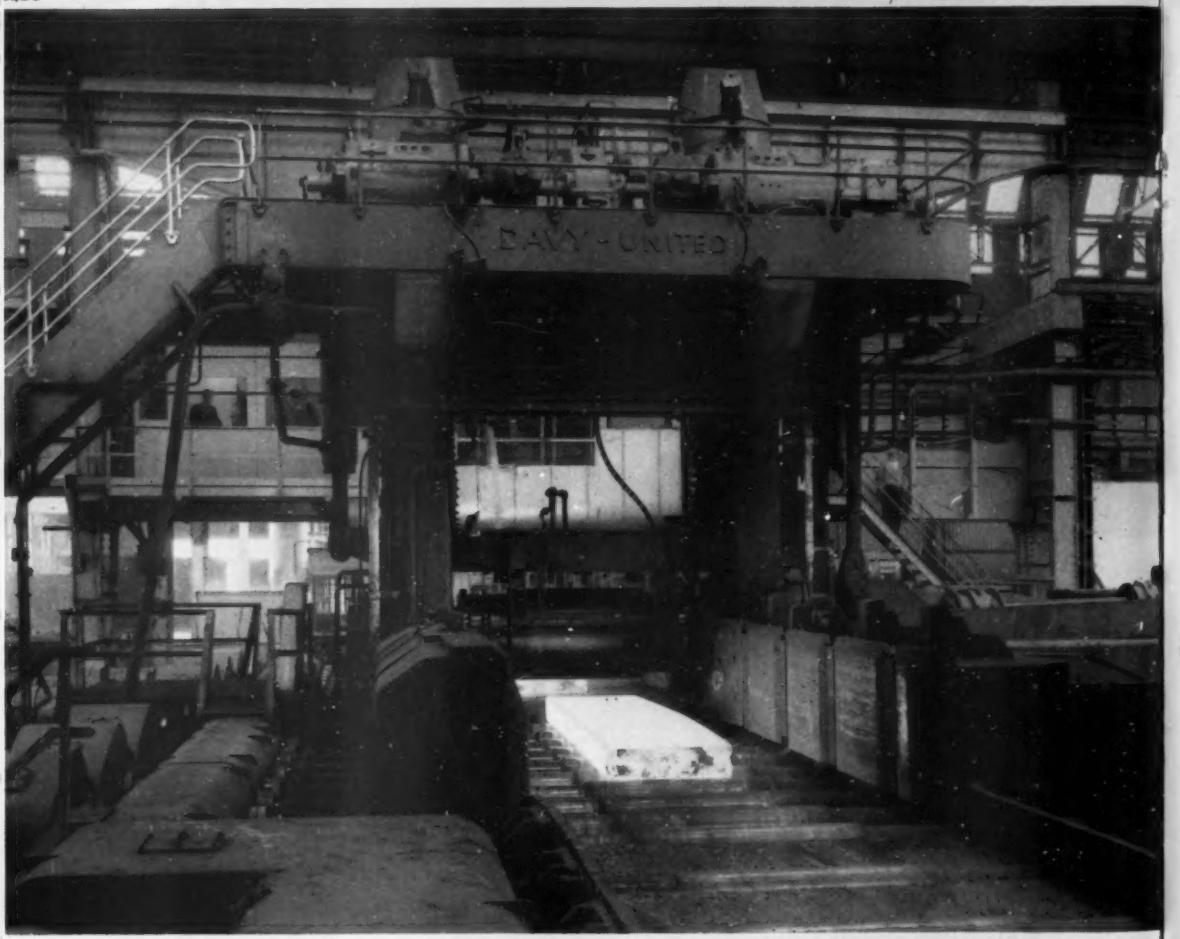

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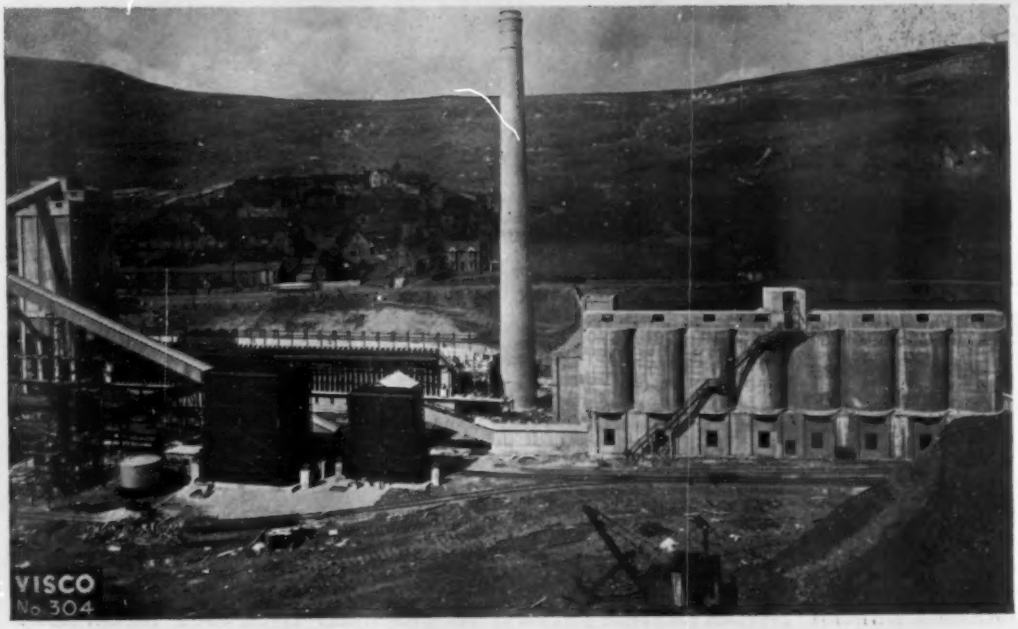
Victoria Steel Works, Ebbw Vale



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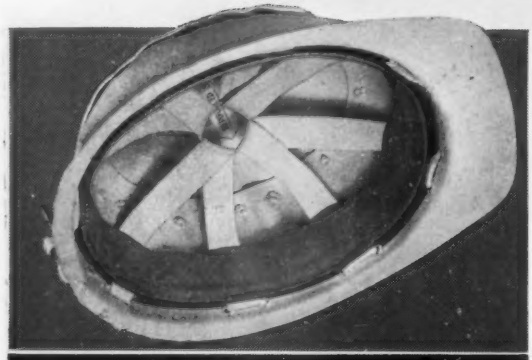
Comfortable to wear at all times



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177 McConnells

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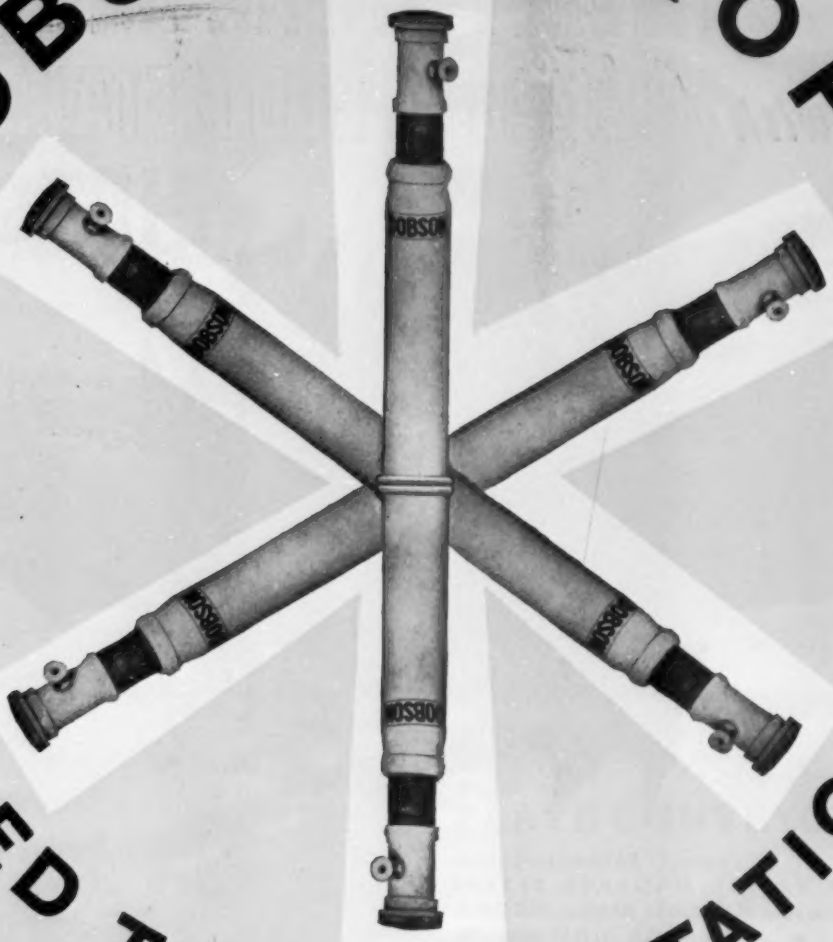
DOBSON PROPS

DESIGNED TO AVOID STATIC LEAK



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Dobson Hydraulic Props are designed to avoid static leak. Each prop is long period tested in an inverted position before despatch to customer.
Hard Chrome Pressure Cylinders are available at a small extra charge for use in conditions conducive to rusting. Props incorporating this refinement have shown no signs of rusting after a period of two years use in corrosive conditions. Hard Chrome Bores also prolong the life of the Hydraulic Seal.

DOBSON

Dobson Hydraulic Props are available in the following Yield Loads:—
25 Ton, 18 Ton, 10 Ton.
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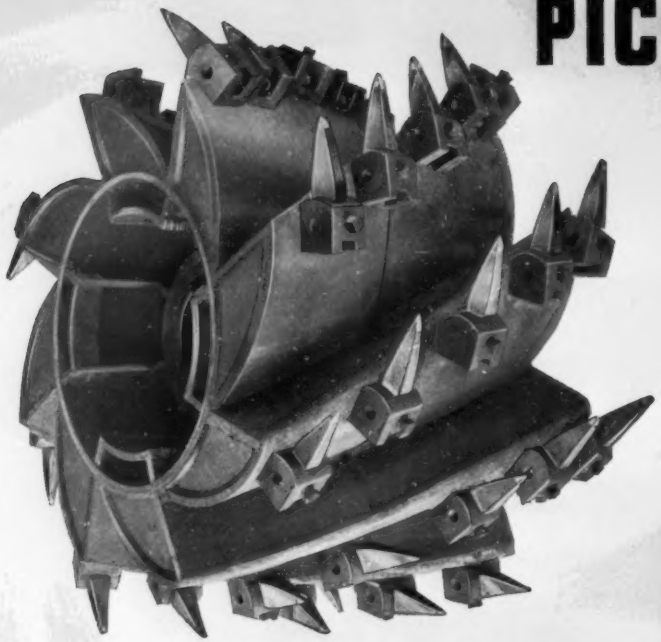
The HEELEY SHEAR DRUM *with* HIGHER SPEED METALS PICKS



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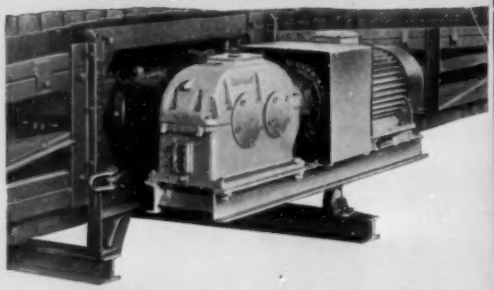
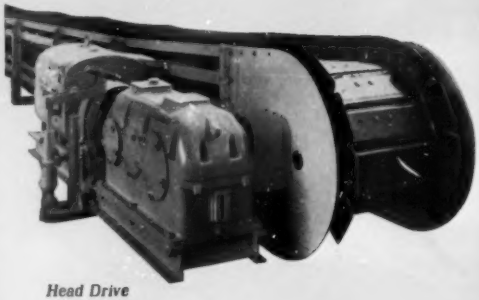
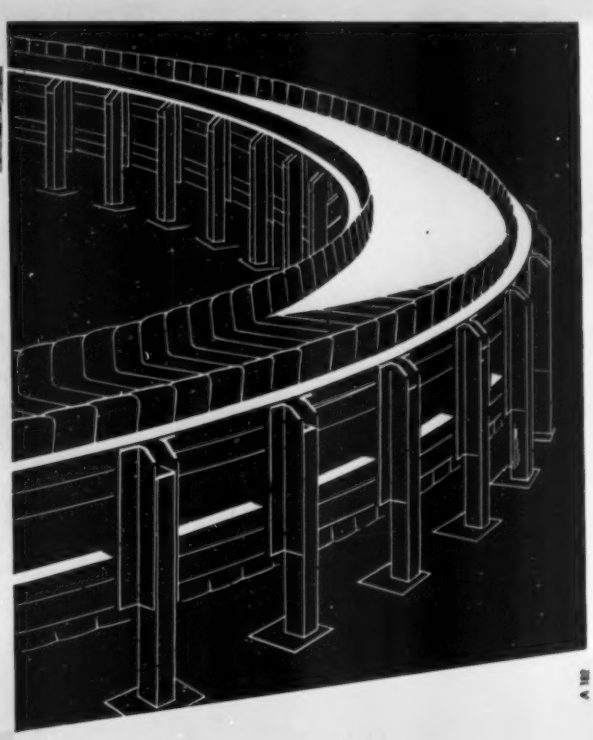
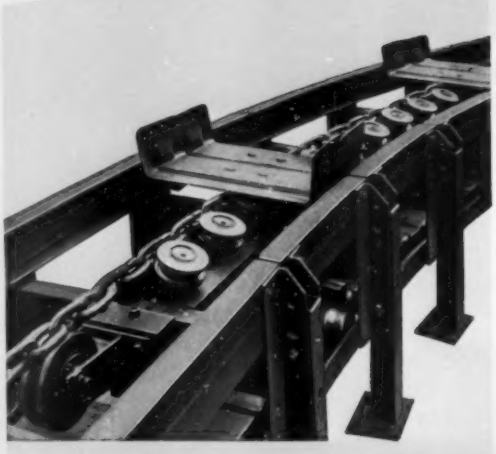


Intermediate Drive



Head Drive





for bends with a 20′ radius

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PLATE CONVEYORS

with Round-Link Chains

capable of negotiating bends in road ways with only 20′ radius.

Available for widths of 400, 540 and 640 mm.

The Head Drive, Type T, powered by 2 electric motors of 50 HP each is designed for running speeds from 3′ to 4′/sec.

By changing the drive sprocket, Type T can also be converted for use with strap-link type chain conveyors.

For trunk conveying 30 HP Intermediate Drives, Type TZ II, can be installed in the line of conveyor. Ingeniously controlled carrier claws are the special feature of the driving chains in the Intermediate Drive (DBP No. 1004545)

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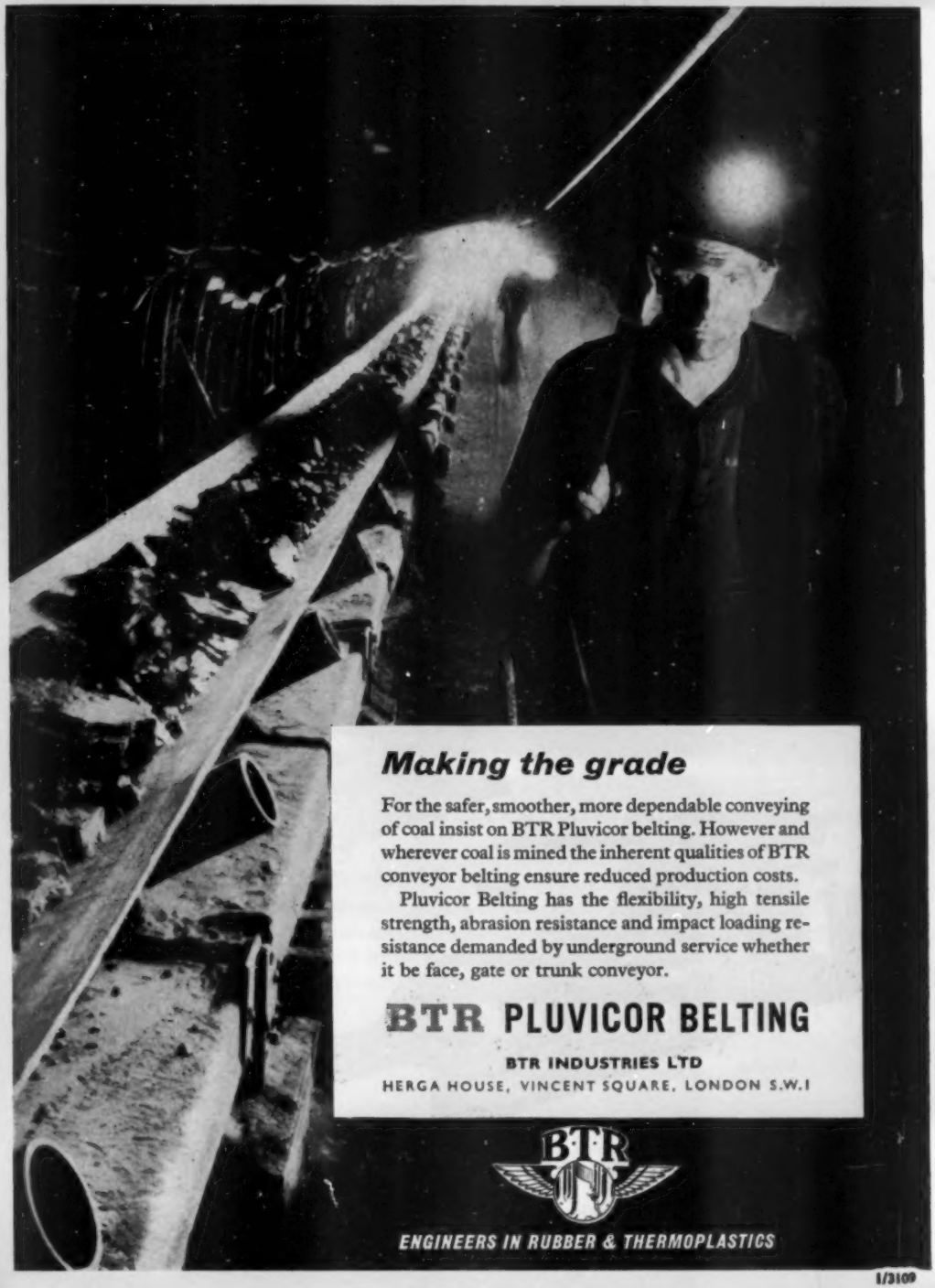
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For the safer, smoother, more dependable conveying of coal insist on BTR Pluvicor belting. However and wherever coal is mined the inherent qualities of BTR conveyor belting ensure reduced production costs.
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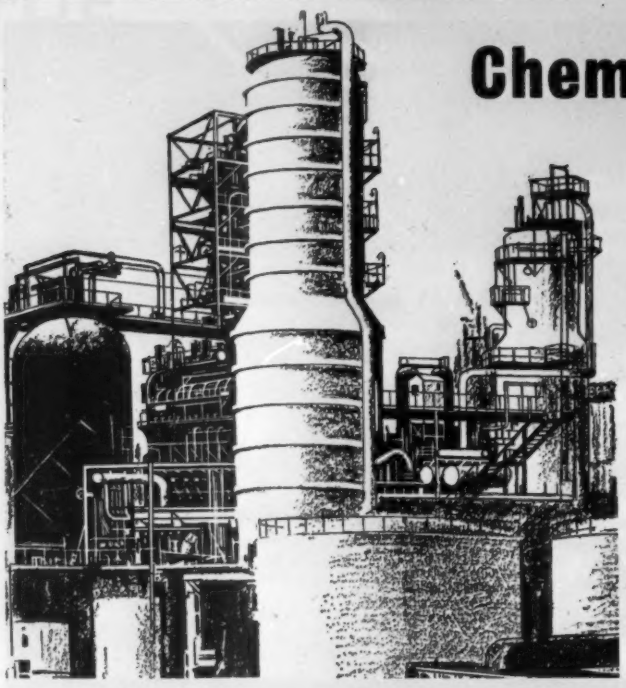

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Eight battery locomotives for Maltby Colliery

A total of eight of these locomotives, complete with roll-off battery changing gear, have been ordered for Maltby Colliery in the North Eastern Division of the N.C.B. Numerous other AEI locomotives are in operation in other Divisions speeding production and helping efficiency underground.

For further information please write to your local AEI Office, or write direct to AEI Traction Division, Trafford Park, Manchester, 17.

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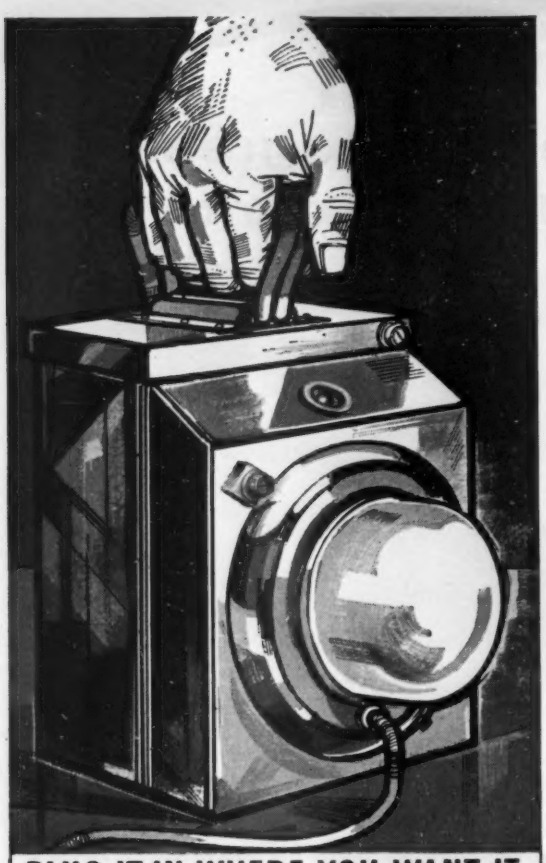

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Offices, Factories, Fire Stations, Hospitals, Schools, Electricity Sub-Stations, Banks, Control Rooms and anywhere where the safety of people and property is involved.

Dimensions: 9" high overall, 8" wide 7½" long over glass. Weight: 13 lb.

NOW! EMERGENCY LIGHTING WHEREVER YOU NEED IT—

CHEAPLY, EASILY

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THE NEW NIFE PORTABLE EMERGENCY LIGHTING UNIT RE6

* Automatic emergency lighting. Upon failure of the 220/250 volt A.C. mains, a relay closes and automatically connects the lamp bulb to the battery.
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* Incorporates a Nife all-steel alkaline battery for long, trouble-free service with minimum of maintenance.
* The Nife battery will stand idle for long periods without deterioration, making trickle-charging entirely unnecessary.
* The lamp contains a double filament bulb and the battery will power the 3 watt filament for about 20 hours or the 18 watt filament for 3 hours per charge.
* Fitted with domed translucent well glass providing intense all-round illumination.

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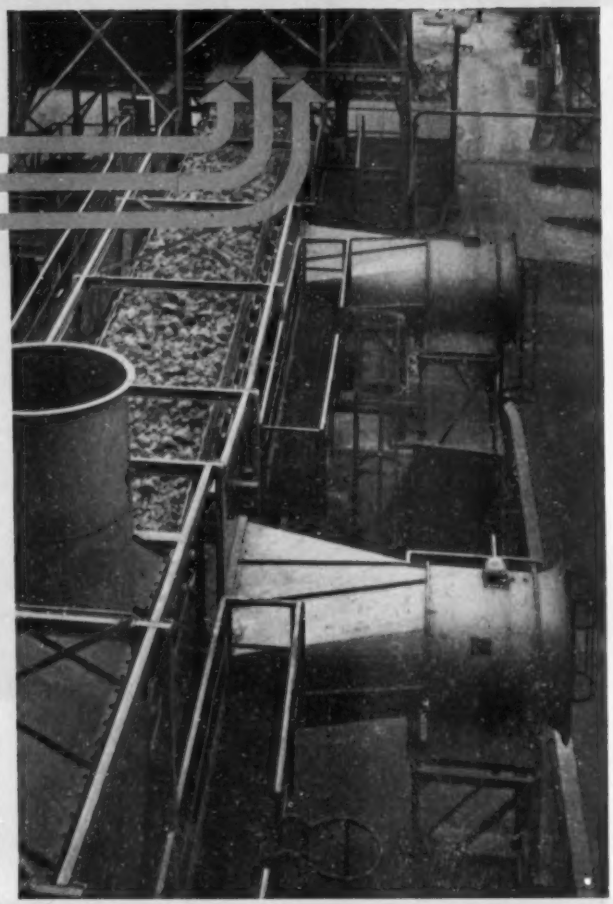
Send for details of our portable lamp range to:
Nife Batteries, Redditch, Worcestershire

N 1400

SPEEDING THE SINTER FLOW

This photograph was taken looking down on the sinter cooler at Barrow Ironworks. On the right of the cooler can be seen two of the three fans which have reduced the cooling interval so efficiently.



For seventy years, we have made steady improvement of the sintering process our business, and each sinter plant we design and install incorporates the latest developments in sintering technique.

At many new sinter plants, including those at Barrow Ironworks, Consett Ironworks, the Iron and Steel Corporation of South Africa, Cockerill-Ougrée (Belgium) and the Société Métallurgique de Normandie (France), a new Huntington Heberlein cooler has increased the efficiency of the sinter process. High quality sinter is being cooled in twenty minutes from 600 deg. C. for transmission on normal belt conveyors. This cooling is achieved by forced circulation from cold air fans which work at very low power consumptions.

Associated in the U.S.A. with Koppers Company Incorporated, our other specialities include: Ore Dressing Plants, High Intensity Magnetic Separators, Herreshoff Furnaces and Badische Turbulent Layer Roasters.

The feed rate control panel at Barrow

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MORGAN
Refractories Ltd
MY BLAIN
TAKE A LOOK AT THIS!
Record Blast Furnace Campaign with new Refractory
The first blast furnace in the United Kingdom to use a British super-duty firebrick for its complete stack lining has just finished its initial campaign. This is the Queen Bess furnace of the Appleby-Frodingham Steel Company and the stack was lined with M.R.2 bricks.
During its campaign the furnace produced 920,700 tons of iron involving a throughput of 2,450,000 tons of burden and 750,000 tons of coke. Throughout the entire campaign the burden consisted of 100% sinter. The tonnage handled by this furnace on such a practice is a record for the Appleby-Frodingham organisation.
AND THIS!
RECORD BROKEN
United Steel's "Queen Victoria" blast furnace at Appleby-Frodingham has beaten the record set up only a month ago by the same company's "Queen Bess" furnace—please see our release of 10th June. For the first time a British blast furnace operating with 100% sinter burden has produced over 1m. tons of iron. The campaign is continuing and the stack lining is in excellent condition. As in the "Queen Bess", the stack is lined with M.R.2 super-duty firebricks manufactured by Morgan Refractories Ltd., a subsidiary of The Morgan Crucible Company Ltd. The campaign has now lasted 112 weeks. During this period the "Queen Victoria" has been charged with 2,570,000 tons of sinter containing 36% iron, 40,000 tons of scrap and 820,000 tons of coke. 26 cwt. of slag is tapped for each ton of metal produced, so that the liquid output of the furnace so far this campaign is 2¼m. tons.
Issued by The Morgan Crucible Co. Ltd, Public Relations Dept. (Battersea 8822) on behalf of Morgan Refractories Ltd.

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For

OXYGEN STEELMAKING PROCESSES

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Marking a new departure in the practical field of oxygen steelmaking, this 20 ton unit for refining blast furnace metal was designed, in collaboration with the Brymbo Steel Works, and constructed by Wellman.

Refining is effected by injecting oxygen and powdered lime, through automatically controlled lances, into the bath.

The vessel has provision for:— slagging, adding scrap and fluxes, fettling, and sampling during operation.

This is a further example of Wellman activities in providing designs and equipment for new steelmaking techniques involving the use of tonnage oxygen.

BRITAIN'S *foremost builders of steelmaking plant*

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for Accuracy and Reliability

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"Clear Space" Hammers are as powerful, adaptable and easy to control as most steam hammers. They are cleaner and much more economical in running and maintenance costs. The ram is of forged alloy steel and is virtually unbreakable. The hammer will strike definite controllable single blows as well as a full range of automatic blows. Made in sizes from 2 cwt. to 2 ton falling weight.

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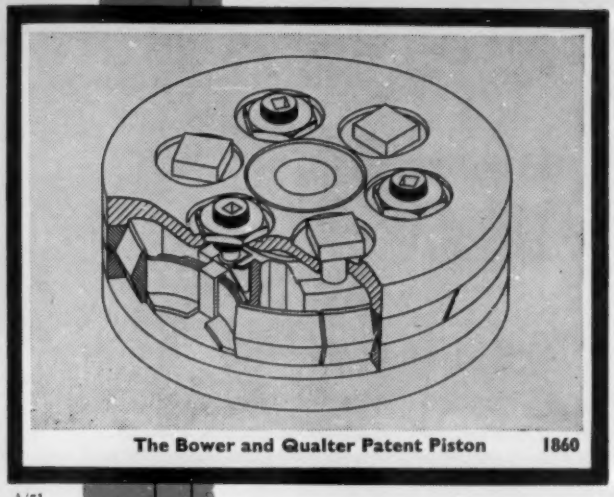

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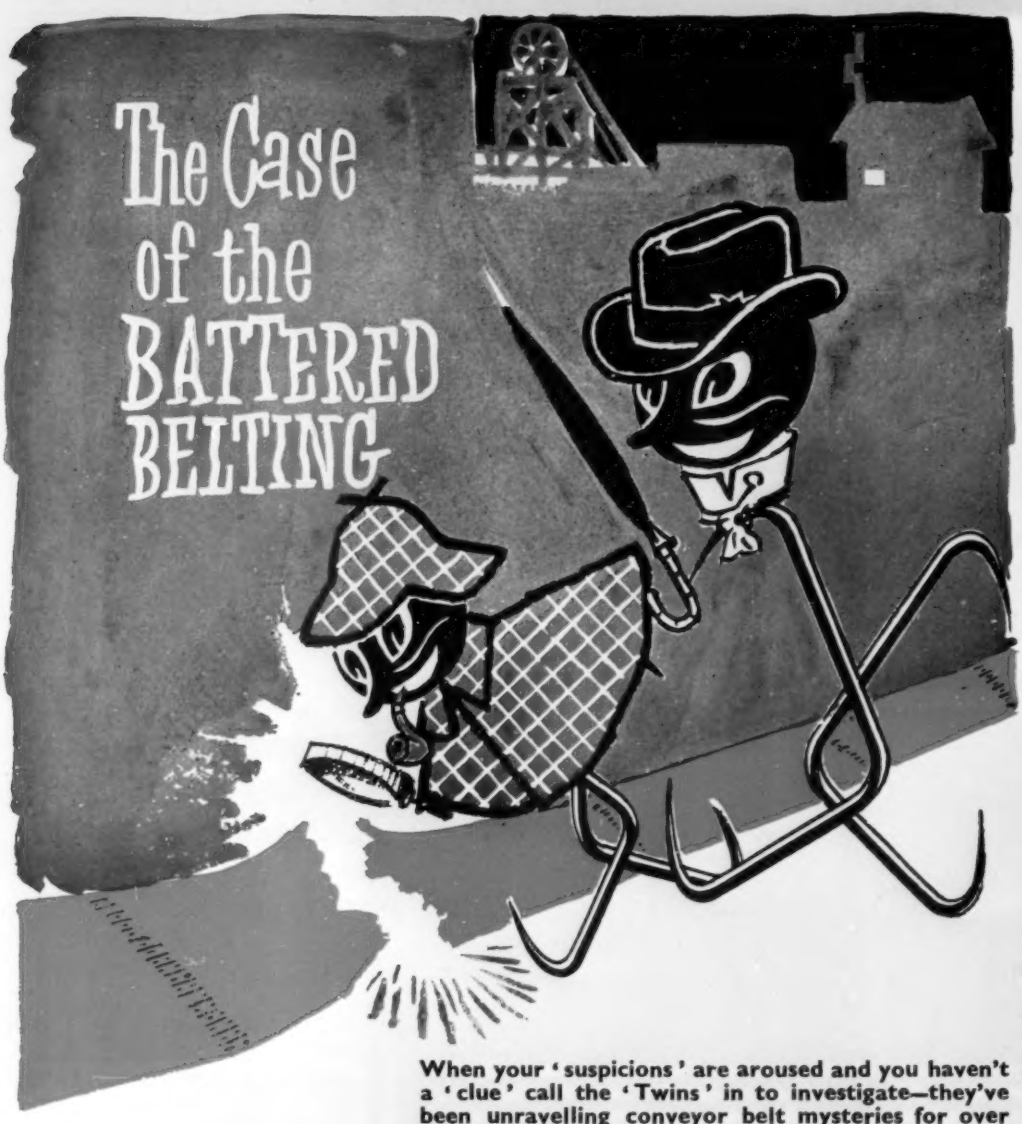

When your 'suspicions' are aroused and you haven't a 'clue' call the 'Twins' in to investigate—they've been unravelling conveyor belt mysteries for over twenty-four years.

Better still, engage their professional services before belt troubles get you down.

"What a superb solution 'Dr. Hayden'"—
"Elementary, my dear Nilos".

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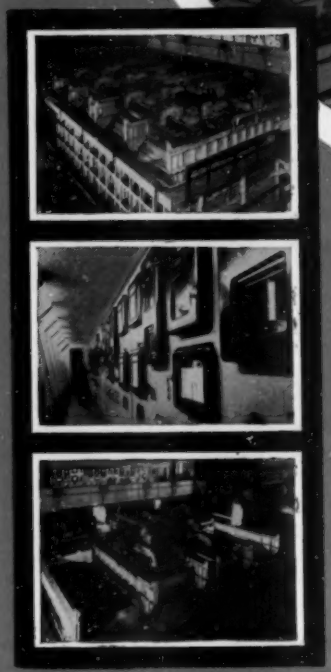

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AUTO SPRAY CONTROL

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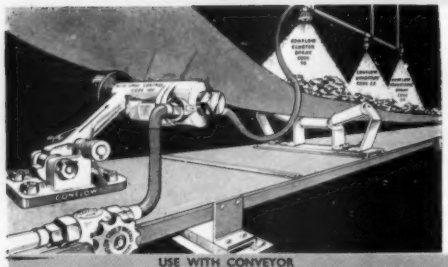

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1960 BLUE RIBBON MINING AWARD

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for achievement in equipment development aiding the technological advancement of the mining industry.

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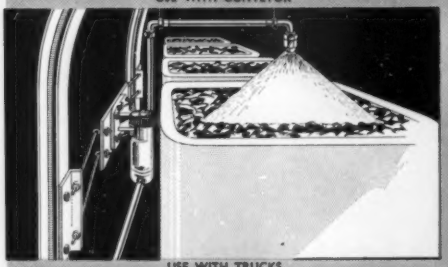

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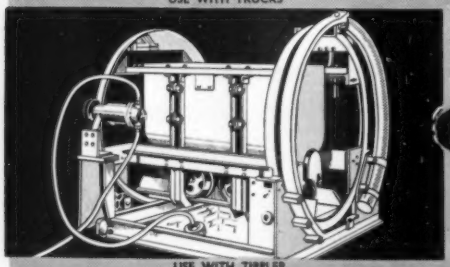

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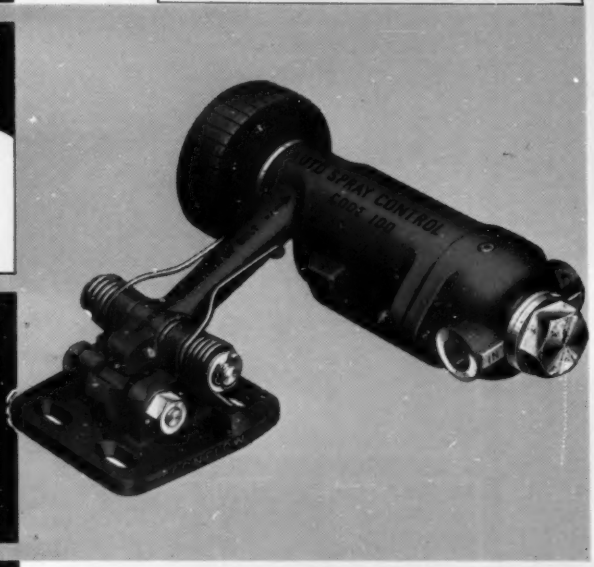

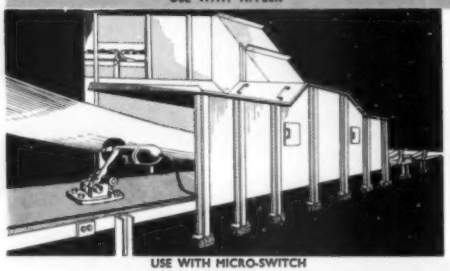

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CONVEYOR IDLER SYSTEM for Mining and Industrial Belt Conveyors

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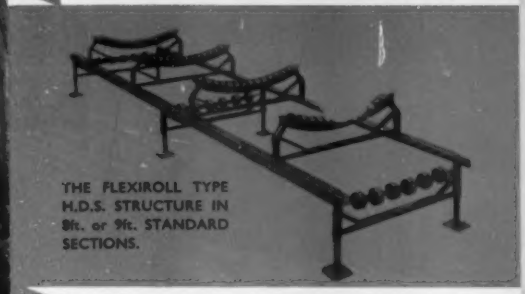
LONGER BELT LIFE

LIGHT WEIGHT

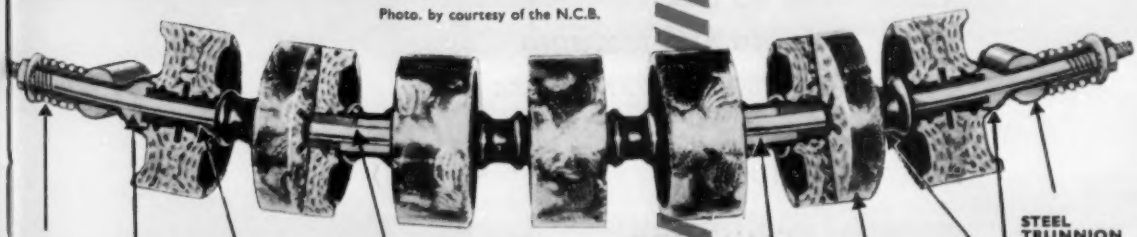
LOW COST



THE FLEXIROLL TYPE H.D.S. STRUCTURE IN 8ft. or 9ft. STANDARD SECTIONS.

The adjustable legs facilitate the lining up of the Conveyor. Flexiroll assemblies can be supplied in sizes for belt widths from 18in. to 48in. Standard Idler Sets are also available for use with existing conveyor structures.

Photo. by courtesy of the N.C.B.



TRUNNION SPRING
Shock absorption permits the shaft to flex as load is increased.

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Ensures long life without maintenance; no lubrication required.

STEEL SHAFT 85/95 TONS TENSILE
Ensures full belt contact with rollers under all load conditions; prolongs belt life.

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Offset to provide ease of belt tracking.

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Protects bearings from ingress of foreign matter.

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High resistance to abrasion, combustion and chemical corrosion. Cushions impact of material on belt and prevents build-up of sticky materials.

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SIZES

BLOOMS	**5" up to 9" square**
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SLABS	**5" to 16" wide × 2" to 2½" thick.**
SHEETBAR	**12" wide × ¼" to ½" thick.**

Other sizes by request

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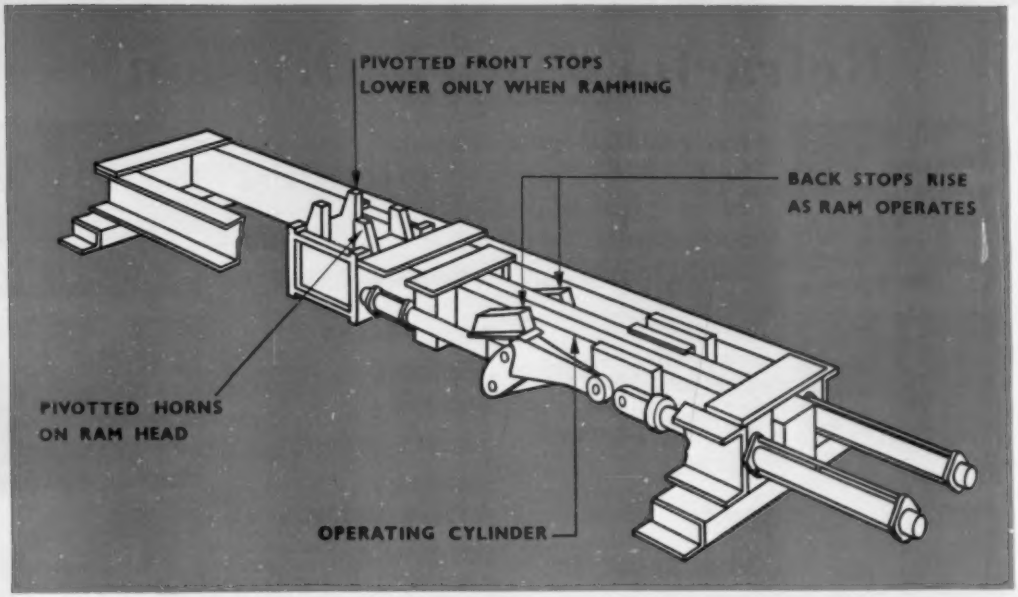

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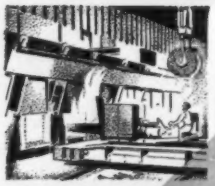

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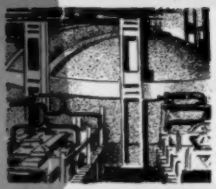

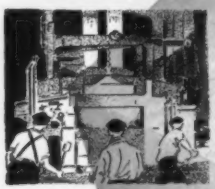

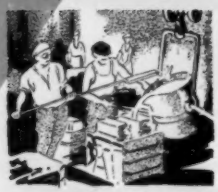

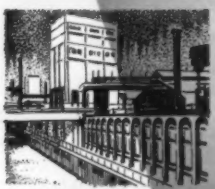

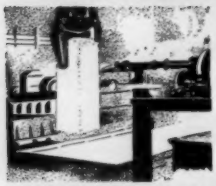

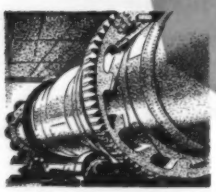

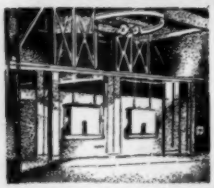

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IRON & COAL TRADES REVIEW

NOVEMBER 18, 1960

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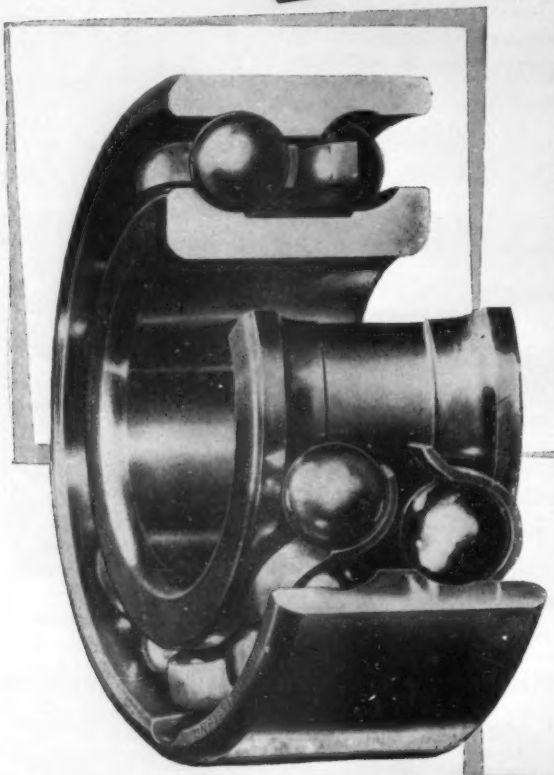

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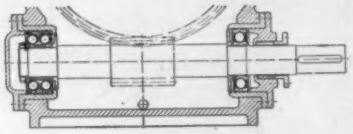

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IRON AND COAL
TRADES REVIEW

Vol. 181 November 18, 1960 No. 4,818

World Steel

SOME forward-thinking on international steel affairs is combined with an outline of the steel market in 15 years' time in a report* recently produced by the United Nations Steel Committee in Geneva. The authors of the report have examined the whole history of world steel consumption, from the late nineteenth century until the present day, and have deduced from it a law of growth. This is that the rate of increase of steel consumption tends to diminish the higher the absolute rate of consumption that is reached. In other words, as the world, and its individual countries, become economically more advanced, their need for steel becomes less urgent.

This, as the British Iron and Steel Federation points out in the latest issue of "Steel Review," is a tenable proposition. The construction of bridges, railways, docks, mines, and public buildings engages the attention of a country at the outset of its economic development. These activities are all heavy consumers of steel. As the economy of a country matures it proceeds to the manufacture of machinery and consumer goods, requiring a small unit weight of steel. Later, there is the natural tendency to switch to newer materials. Relatively, the period of development and change may be short or long, but experience lends support to the law of growth deduced by the experts at Geneva. It should perhaps be stressed here that "growth" is the operative word. Although the rate of growth may tend to diminish, growth still takes place, and over a relatively short period of years can mean a very big tonnage indeed in terms of steel consumption.

Having accepted this law of growth as established, the authors of the report then expressed it as a mathematical formula, and used this in turn to draw a curve of theoretical growth of consumption. The theoretical curve was then superimposed on the real historical curve of consumption. The fit of the theoretical curve is very close over the whole period, except where development is interrupted by wars or severe economic crises. The formula for the rate of growth appearing therefore to be reasonably sound, the theoretical curve was projected forward to 1972-5, the period of the forecast, and a figure of consumption at that date predicted. The prediction, with the necessary proviso that no wars or severe depressions occur in the interval, is some 625,000,000 metric tons of world steel production.

By methods which would take a lot of space to describe, but which appear to be soundly based, the experts went on to compute the consumption of steel in each individual country. The conclusions reached are of interest. The United Kingdom estimate, at 32,000,000 metric tons, compares with the 21,000,000 tons recorded in 1959, and implies an average rate of increase only slightly lower than that maintained in the years 1950-7. A considerable slackening of the rate of expansion is, however, foreseen for Western Germany, consumption of 36,000,000 metric tons, only 4,000,000 tons above the British total, being forecast. For France, a rate which, though lower in itself, remains higher than either of these, is predicted, bringing her to 25,000,000 tons. The area of minimum expansion is shown to be the Saar. Outside Europe, the United States, although credited with a much lower rate of expansion, is put at 145,000,000 tons, much in advance of the Soviet Union at 113,000,000 tons. In the Far East, Japan is depicted as retaining her very high momentum, with an ultimate consumption—within the period—of 35,000,000 metric tons of steel. A qualified forecast for China suggests a rise to 53,000,000 tons. An even more substantial rate of growth—to 28,000,000 tons—is prophesied for India.

The world forecast for production is necessarily the same as that for consumption. The authors of the report make no claim that the study is a series of exact prophecies. The curves of development so far observable may not be the major or even the most important part of the total progression. But progress there will be, and the survey made by the experts at Geneva is a valuable appraisal of known factors which presents at least a feasible outline of the steel market as it will be in 15 years' time. If the experts are right, we have scarcely as yet entered upon the age of steel.

* "Long-term Trends and Problems in the European Steel Industry." Secretariat, Economic Commission for Europe, United Nations, Geneva.

Finance for New Zealand Steel Project

ARRANGEMENTS have been made to provide the finance for the steel mill which Pacific Steel is building in Auckland, New Zealand.

Total cost of the project is estimated at £3,600,000. Of this, £1,650,000 will be provided in the form of equity capital, 60 per cent by a New Zealand group led by Fletcher Holdings, and 40 per cent. in equal amounts by Colvilles, Guest, Keen & Nettlefolds, and Stewarts and Lloyds.

The mill will have an initial capacity of 50,000 tons of rolled bar products a year.

Passing Thoughts . . .

INSUFFICIENT credit is given to the [trade union] movement for the outstanding work that has already been carried out in the course on management subjects provided by the TUC and some of its member unions. There is material for criticism in trade unions, but there is fully equal scope for criticism of some employers, and healthy self-examination will do far more good than a continual search for culprits everywhere but at home.—SIR BERTRAM WARING, chairman and managing director of Joseph Lucas (Industries), Limited, and chairman-elect of the British Productivity Council, in a letter to the bulletin of the BPC.

The engineering world outside Britain is not standing still: too much in British industrial life is tending to be static.—The Guardian.

Cynheidre Colliery represents fulfilment of great hopes. It is an act of faith in coal. It is an answer to the critics who blandly and, I maintain, falsely, predict a rapid decline in the importance of our great industry—MR. H. E. COLLINS, member for production, National Coal Board.

Qualities of mind developed by technical training—honest and logical thinking, respect for others, and contempt for difficulties—are valuable in any walk of life.—DUKE OF EDINBURGH, presenting awards at the College of Aeronautical and Automobile Engineering.

May an exporter suffering from an excess of exhortation humbly suggest to our Prime Minister that he in turn will find it fun to tackle firmly, and not by mere exhortation, the basic causes of unofficial strikes.—MR. P. A. WILLS, in a letter to The Times.

Official restraints cutting back domestic expenditure on industrial re-equipment is an economy the country can ill-afford. Technology does not pause for economic recovery, nor indeed for the funds with which to exploit it.—SIR IVAN STEDEFORD, chairman of Tube Investments, Limited.

If we are to prosper or even survive in this country we will have to be as often as possible that one vital jump ahead of our competitors, but what worries me in the present world situation is that it does not seem to be this country which is that vital jump ahead.—PROF. C. MACRAE, Royal College of Science and Technology, Glasgow.

Strikes, clumsy management, and old-fashioned equipment are partly responsible for falling orders to British shipyards.—Wirtschaftscorrespondent, a West German shipping weekly.

I am alarmed to learn from your leading article today that the Duke of Beaufort rides in a car bearing the registration number MFH 1. At these works we travel in FOX 1. May I be assured that, should we happen to meet his Grace on the road, no unseemly incident will occur.—MR. H. P. FORDER, Samuel Fox & Company, Limited, branch of the United Steel Companies, Limited, Sheffield, in a letter to The Times.

BRITISH INSULATED CALLENDER'S CABLES, LIMITED—Group sales in the half-year ended June 30, 1960, were £11,000,000 higher at £74,000,000 than those in the corresponding months of 1959 and £9,000,000 above those of the previous half-year. The increased turnover is being maintained in the second half of the current year, states the chairman, Sir William McFadzean. Net profit during the period was £1,748,000.

Record Year for Remploy

AN increase of nearly £1,000,000 took the sales of Remploy, Limited, for the first time well over the £5,000,000 mark during the year ending March 31. This was announced by Sir Alec Zealley, chairman, at the company's annual meeting in London on Wednesday.

Production and sales of Remploy, the national organization for employing severely disabled people, both rose by about 23 per cent. over the totals for the previous year—itself the company's best to that date. These results have been achieved in a year when there has been a small increase in the number of disabled employees. An average of 6,251 was employed during the year, and there has been a further increase of 100 since March 31. For the first time, sales at £5,143,000 have exceeded the cost of wages paid to disabled workers, plus the cost of raw materials.

The sponsorship scheme (through which production for other industrial concerns is undertaken by Remploy) contributed nearly £500,000 to the year's revenue and provided employment for 650 disabled.

During the financial year 1961/62 a grant of £2,750,000 will be paid by the Government towards the company's running expenses, compared with an estimate of £2,694,000 for the current year. The 1961/62 figure will be increased by £50,000 in each subsequent year to £2,950,000 in 1965/66. In addition, £1,750,000 will be made available during the five-year period by way of loan to cover capital expenditure, subject to any over-riding need to reduce public investment generally. Both these figures represent a substantial increase over those provided for the current five-year period, and over the next five years should enable the company to effect a progressive increase in the numbers of severely disabled persons employed.

SCOW to Close Port Talbot Works

WHAT is virtually the last operational department of the 57-year-old Port Talbot steelworks of the Steel Company of Wales, Limited, is to close. The company has submitted a new development scheme to the Iron and Steel Board, which if approved will involve increased outputs from the steelmaking plant at the Abbey Works, but will also bring about the closure of the Port Talbot melting shop.

The company has emphasized that it cannot predict an exact date of closure, but it is likely to be about the end of 1962. An alteration in the company's trading position, however, could bring about an earlier shutdown.

Employees at the Port Talbot works have been informed through their trade union representatives of the position.

British Transformer on Duty in Moscow

ORDER from the Ministry of Works to supply a large power transformer for the British Government stand at the Moscow Trade Fair next May has been won by Twickenham Transformers, Limited. The transformer, weighing nearly half a ton, will be shipped to Russia next month.

Mr. Gerald Bennett, chief engineer, commented: "The order is worth several hundred pounds, but the prestige value to the firm is considerable. The transformer will be used to convert Russian power to British power so that British equipment may work on the stand at Moscow."

RTB's Iron-ore Needs

OBJECTIONS TO OXFORDSHIRE PROPOSAL

FINAL witness for the applicants, Richard Thomas & Baldwins (Mineral Recovery), Limited, to mine iron ore in north Oxfordshire, was heard on Thursday of last week when the managing director of the company, Mr. W. J. A. Knibbs, gave evidence before the public inquiry which is being conducted into the application by the Minister of Housing and Local Government. Mr. Knibbs maintained that it was rapidly becoming impracticable to start ironstone mining by the target date of March because of planning and other delays.

It was revealed that the Oxfordshire Ironstone Company, Limited, which is jointly owned by Stewarts and Lloyds, Limited, and Guest, Keen & Nettlefolds, Limited, has worked about 800 acres near Wroxton, north of Banbury. This company has planning permission for a further 2,000 acres and has sent in applications which are not being opposed by the Oxfordshire County Council for another 2,563 acres.

It has been part of the objectors' case against the opening of further mines over the 7,000 acres of the present inquiry that the Wroxton fields should be worked out first.

A Matter for the Main Company

Mr. Knibbs revealed that there was an understanding with the Oxfordshire Ironstone Company to supply 500,000 tons a year and later 1,000,000 tons if satisfactory contracts were concluded. He told Mr. R V. Cusack, QC, for the Oxfordshire County Council, that no contract had in fact been prepared.

Mr. Cusack: "You have been pressing the urgency of this case. Why haven't you made any contract?"

Mr. Knibbs: "That is a matter for the main company of RTB."

Mr. Knibbs emphasized that 1,000,000 tons of Oxfordshire ore would be needed annually until 1964 and then demand would be for 2,000,000 tons. That was why present areas were needed.

On Friday, witnesses for the chief objector to the proposal—the county council—attacked the application on economic planning and afforestation grounds. Prof. P. S. Florence, Emeritus Professor of Commerce, Birmingham University, said that prices and freight rates had moved in favour of foreign ore against home ore between 1956 and 1959; and between August 1957, and October 1958, railway merchandise rates had increased by 17½ per cent.

The Iron and Steel Board, he said, had spoken of a necessity to seek substantially greater quantities of ore from abroad. Home ore would always be with us, but the availability of the most economic foreign ore fields must depend on obtaining control and undertaking development in such fields before other countries got in ahead of Britain. The new sources of iron ore being discovered in the world suggested that the trend in favour of imported ore was a long-term one.

Mr. W. R. Brackett, a chartered surveyor, claimed it was completely unsound to have two open-cast areas working at once. It was infinitely preferable to work out one area, keeping the other in reserve. As the Steel Company of Wales, Limited, had ceased to take ore from the Wroxton workings these mines could well supply the needs of RTB at Spencer Works. "RTB may want to control their own sources, but this has no relation to planning consideration," he maintained.

The inquiry, which was resumed on Tuesday, heard Mr. Morris Wayne Robinson, planning adviser to Oxfordshire County Council, assert that the working of any mineral by open-cast methods almost invariably brought spoliation of the countryside. If there were any possible means by which supplies of raw materials could be economically produced other than by open-cast methods it was essential to use them.

It was accepted without question that land from which ironstone had been extracted could be and was restored to productive use. What could be done could be clearly seen from the excavations of the Oxfordshire Ironstone Company, near Banbury.

Mr. W. A. Smith, general manager of the applicant company, was recalled and said in reply to Mr. Cusack that over most of the areas concerned blasting would be necessary to loosen the ironstone. The company would do all it could to minimize its effects.

From the economic point of view no case had been made out by RTB, Mr. Cusack contended on Wednesday. High-grade quality ore was available from abroad and if the application did succeed a useful strategic reserve would be used up which would not be available in time of emergency.

He criticized the fact that the application was really from the parent company but only one person —Mr. R. A. Hacking, director of research—had appeared from it and he was not in a position to deal with policy or administration.

The Iron and Steel Board had refused to send a member to speak of the policy of the board on the grounds that he could not say what was in the minds of other members when policy was discussed.

At no time had the applicant explained what the difficulty would be if 100 per cent. foreign ore were used in the new Spencer steelworks. "What is one to make of a situation where the Iron and Steel Board say the primary factor in using home ore is cost and the applicants themselves decline to make any reference to cost?"

There was a progressive reduction in foreign ore prices while home ore was going up. Shipping, formerly short was now available, whereas home freight charges were still rising. In any case a vast amount of the ore used at the Spencer works would have to be imported. It had by no means been established that the policy of using home ore at the works was in the national interest of all.

Personal

Mr. H. C. MARGRETT, general manager and a director of G.E.C. Overseas Services, Limited, a subsidiary of the General Electric Company, Limited, has retired after 40 years' service with the group.

A presentation was made last Friday to Mr. G. E. D. HALAHAN, works manager of Steel, Peech & Tozer branch of the United Steel Companies, Limited, who is leaving to become general manager of Round Oak Steel Works, Limited (Staffs).

In a tour of the Tyne area on Monday and Tuesday, Lord CARRINGTON, First Lord of the Admiralty, visited various shipbuilding and engineering firms. He also met several leading industrialists and stressed the importance of the Government's export drive.

Mr. C. M. PEEL, who has resigned the secretaryship of the South Staffordshire and Warwickshire Institute of Mining Engineers, has been succeeded in that appointment by Mr. J. E. STRACHAN, a past president of the institute. Mr. Strachan's address is Lindley Lodge, Watling Street, Nuneaton.

Mr. H. DOUGLASS, general secretary of the Iron and Steel Trades Confederation, who has retired from the Council for Scientific and Industrial Research on completing his term of service, is succeeded by Mr. Frank Cousins, general secretary of the Transport and General Workers' Union.

THE British Trades Union Congress gold medal was presented to Mr. James McGuire (89) by Mr. Ted Hill, president of the TUC, on Monday. Mr. McGuire resigned as district secretary of the Motherwell branch of the Boilermakers' Society five months ago after holding the office for 60 years.

New chairman of the Mining Surveyors' Committee of the Royal Institution of Chartered Surveyors is Mr. GEORGE ALEXANDER of North Staffordshire who succeeds the late Mr. C. P. Bates, also of North Staffordshire. Mr. Alexander has also been appointed to the council of the newly-formed Southern Counties Institute of Mining Engineers.

More trained technicians are being produced in Russia than in America, Britain, and western Europe combined, Sir GEORGE BINNEY, a director of the United Steel Companies, Limited, told fellow members of the Sheffield branch of the Institute of Directors last week. He recently toured the USSR as a member of a delegation from the Institute.

Mr. E. V. BEATSON of Joseph Lucas, Limited, has been appointed by the Council of the British Welding Research Association to serve on the association's research board. His principal fields of interest are resistance welding and brazing, his work on the latter being particularly well known through the book "Industrial Brazing" of wh'ch he was a joint author.

Mr. E. H. BROWNE, deputy chairman of the National Coal Board, and Mr. W. L. MATHER, chairman of Mather & Platt, Limited, engineers and ironfounders, of Manchester, have been appointed members of the Clean Air Council until April 30, 1963. Mr. Browne, who was chairman of the West Midlands Divisional Coal Board, became deputy chairman of the NCB in September on the resignation of Sir Joseph Latham.

Dr. R. A. MOTT, consultant to the British Coke Research Association, has been elected president of the Coke Oven Managers' Association for the coming year. He took up his present post in 1959 on relinquishing his position as superintendent of the chemical and physical laboratories of the association's Coke Research Centre, at Chesterfield. Before that he was director of the Midland Coke Research Station, Sheffield.

Cynheidre Colliery Opened

MR. H. E. COLLINS, member for production of the National Coal Board, formally opened Cynheidre Colliery yesterday (Thursday). The colliery, which is 5 miles north of Llanelly (Carm), has been designed to provide for the continuity and expansion of the supply of anthracite to inland and export markets and also to ensure the continued employment of miners in the Gwendraeth valley. When fully developed, the colliery will have a capacity of 4,000 tons of saleable coal per day and will employ 2,800 men.

The development of the colliery is the most costly and complex project yet undertaken by the NCB and by 1963, £14,000,000 will have been spent in developing the reserves. At that stage the colliery is expected to be producing 550,000 tons of saleable coal per day and to be employing about 1,800 men.

A comprehensive account of the development and construction of Cynheidre will be given in subsequent issues of IRON AND COAL.

New NCB Group Manager for Cannock Chase

FOLLOWING the recent retirement of Mr. C. M. Peel, Mr. J. V. Cumberbatch has been appointed Group manager of the No. 4 production group of Cannock Chase Area of the West Midlands Divisional Coal Board with effect from a date to be agreed. The collieries within the Group are Cannock Chase No. 8, Coppice, and Walsall Wood.

From 1932, when he entered mining as a student with the Stafford Coal & Iron Company, Limited, until 1945, when he undertook service with the Control Commission (North German Coal Control), Mr. Cumberbatch gained extensive mining experience in north Staffordshire collieries. After more than two years with the German Coal Control he was appointed assistant manager of Littleton Colliery (Staffs) in 1948. He became manager of the colliery two years later and has held that post to date. During his long association with the colliery he has been closely concerned with the large-scale reconstruction scheme there.

"KEEP ON ASKING WHY" was the advice given to apprentices of Richardson, Westgarth & Company, Limited, by Dr. A. Frankel, director and chief engineer, at a recent prizegiving. The fact that only one in six of the company's apprentices was employed in straight mechanical engineering showed, he said, that whether they liked it or not they had to keep on learning new skills.

MR. ROBENS' OPTIMISM

Remote Possibility of Cheaper Fuel

POSSIBILITY—albeit a qualified one—that fuel prices might be reduced "in the long future" was made by Mr. Alfred Robens, chairman-designate of the National Coal Board, speaking at a Press interview at the Nottingham headquarters of the East Midlands Divisional Coal Board on Wednesday. He said: "In the long future with the great amount of re-deployment now taking place in the industry, with the new pits, and remembering that 80 per cent. of the coal produced in this country in a few years' time will be coming from new and reconstructed pits there is in my view a possibility of fuel prices being reduced."

On the question of expansion he said there were many fields open to the industry, including the supply of coke to the carbide industry and the supply of smokeless fuel. He was trying to speed up the production of smokeless fuel in view of the many smokeless zones now being planned or being brought into operation.

Coal stocks in the East Midlands were now being moved more quickly than most people thought possible last year. It was hoped to clear 7,000,000 tons by the end of the year.

New Headquarters for Durham NCB

NEW headquarters for the Durham Divisional Coal Board on the Team Valley Trading Estate, Gateshead, is nearing completion and the transfer to the new premises has started. The move has been planned to cause the least possible dislocation of work. The building consists of a three-storey reinforced concrete office block 421-ft. long, with three wings and has cost approximately £400,000.

At present the board is occupying leased offices in 12 different buildings in the most congested part of Newcastle. The new offices will enable the division to operate more efficiently, and to reduce costs and at the same time will give good working conditions for the clerical and administrative personnel.

All departments will, eventually and for the first time, be located under one roof. The transfer of marketing department will not take place until 1961. The postal address of the new divisional headquarters is:—Team Valley Trading Estate, Gateshead 11, Co. Durham (telephone: Low Fell 78822; telegraphic address: Coalboard, Gateshead).

Successful Scottish Mining Recruitment Campaign

"A MOST encouraging number" has been brought forward in the last two or three months by the large-scale recruiting campaign organized by the Scottish Divisional Coal Board. A spokesman for the board said on Monday that in the first 10 months of the year well over 4,000 men had been recruited and the rate of wastage had fallen by 2 per cent.

The scheme was now in full swing in all parts of the coalfield, but the board still wanted as many re-entrants as possible—there were still unlimited jobs for men with skill, training, and knowledge.

South-Western NCB Chairman to Retire

AFTER nearly nine years as chairman of the South-Western Divisional Coal Board, Mr. David Morgan Rees is to retire early in the New Year. Mr. Islwyn Evans, public relations officer of the South-Western Division, states that Mr. Rees has had a serious illness and the NCB and Mr. Rees have reached the conclusion that it would not be reasonable to expect him, after such an illness, to continue to shoulder the burden of office as chairman.

MR. D. M. REES

Born in India, Mr. Rees, who is 56, comes of a mining family. His father, the late Mr. Rees Rees, was at one time agent for North's Navigation Collieries (1889), Limited. Educated at Llandovery College and Birmingham University, where he qualified as a mining engineer, Mr. Rees had early experience in the industry, working below ground in South Wales pits between school and university.

His first post as colliery manager was at Caerau Colliery, Maesteg, and in 1937 he was appointed manager of Bestwood Colliery, Nottingham, then owned by B.A. Collieries, Limited, by whom he was later appointed agent. On nationalization he became general manager of No. 4 Area, East Midlands Divisional Coal Board, then recognized as the most productive and highly-mechanized division in the country. He was appointed chairman of the South-Western Division in 1952 in succession to the late Mr. Gwilym Aeron-Thomas.

Mr. Rees was made CBE in 1956 and is a Commander (Brother) of the Order of St. John. He served on the Council for Wales and Monmouthshire from 1953 to 1956.

PALACE THEATRE site at Leicester, which is being redeveloped as a shopping block, has been bought as an investment by the National Coal Board Superannuation Fund.

Obituary

Mr. JOHN WILLIAM WARD, chairman of the Gilbow Tool & Steel Company, Limited, Sheffield, has died at the age of 83.

Mr. WILFRED L. ANDERSON, marketing officer (bricks) of the Durham Divisional Coal Board, has died at the age of 63.

The death has taken place of Mr. STANLEY FIELD, senior accountant of Accles & Pollock, Limited, Oldbury (Worcs). He was 61.

The death has taken place of Mr. WILLIAM J. PIGGOTT, a former director of Laporte Industries, Limited, London, W.1. He was 67.

The death has occurred of Mr. JOHN KITCHING, a retired railway engineer, whose grandfather founded the Hopetown Foundry, Darlington, a forerunner of Whessoe, Limited. He was 77.

The death occurred last week of Mr. DANIEL WOOD, at Whitley (Yorks), colliery owner. He was owner of the small Falhouse Wood and Quarry Wood collieries, which he operated under licence from the National Coal Board.

Mr. WILLIAM GEORGE NAYLOR, for 39 years on the staff of the Staveley Coal & Iron Company, Limited, Chesterfield, and cast iron pipes advertising manager from 1932 until he retired in 1950, has died at the age of 75.

Mr. ALBERT GARDNER, director and general manager of Cammell Laird & Company (Shipbuilders & Engineers), Limited, has died at the age of 66. He joined the company 46 years ago, was appointed commercial manager in 1943, and joined the board at the end of 1954.

Mr. CLIFFORD BROOKS, who died recently at the age of 69, was formerly Manchester representative for Mather & Platt, Limited, electrical, textile, hydraulic, and fire protection engineers, of Newton Heath, Manchester. He retired five years ago after 50 years' service with the company.

On Monday the death took place of Mr. ALBERT LEONARD RICHARDS, a director of C. & S. B. Pumphrey, Limited, chain and hook manufacturers, of Small Heath, Birmingham. Mr. Richards, who was 71, entered the family business as a boy and had been a director since it was registered as a company in November, 1944.

Awarded the Rescue Medal in the Minnie Pit disaster at Halmerend (Staffs) in 1918, Mr. WILLIAM THOMAS SNEYD has died at the age of 86. He was a member of the No. 1 rescue team from the old Racecourse Colliery, then owned by the Shelton Iron, Steel & Coal Company, Limited. Mr. Sneyd was a fireman at the pit until he retired, following a mining injury, in 1935.

Consett Iron Development Scheme

FIRST part of the £30,000,000 development scheme being carried out by the Consett Iron Company, Limited, is nearing completion with the commissioning of the new 4-high plate mill at Hownsgill, Consett.

The mill, designed to produce 10,000 tons a week of steel plate in sizes ranging from $\frac{3}{16}$ in. upwards in thickness and up to 120 in. wide and 90 ft. long, is already in operation on a two-shift rolling and three-shift shearing system.

TILLEY LAMP COMPANY, LIMITED—Mr. I. Morgan Phipps has ceased to be a director.

Prescription Wanted for Industry's "Malaise"

WHAT should be the normal length of the working week? How long should a person work in an industry to be worthy of special consideration if he becomes redundant? How much should a particular type of person be paid? How long should holidays be? These were some of the questions asked by Sir Alexander Fleck, FRS, when he delivered the seventh Fawley Lecture at Southampton University on Thursday of last week. The answers, he suggested, should be formulated in an industrial code by a voluntary commission of university staffs, with assistance from trade unions and employers.

"Throughout our social structure in pay-roll and staff ranks alike, there are more signs of dissatisfaction with general working conditions than existed a decade ago. Our technical capacity to produce better and more sophisticated materials and goods is rapidly increasing, but the ability of our people to understand the philosophy of our industrial and scientific operations has not advanced at all," the former chairman of Imperial Chemical Industries, Limited, told his audience.

The "general malaise" of our industrial system had not been seriously investigated, he said, since the Mond Turner Conference of 1927-30, convened after the general strike. That conference had been a worthwhile effort rather than a positive success, but the effort should be repeated.

Shipbuilders' New President

SHIPYARD director of John Brown & Company (Clydebank), Limited, Mr. John Rannie, has been elected president of the Shipbuilding Employers' Federation. He retired a few weeks ago from the presidency of the Clyde Shipbuilders' Association.

Senior vice-president is Mr. R. Cyril Thompson, chairman of Joseph L. Thompson & Sons, Limited, Sunderland, and Dr. Denis Rebbeck, deputy managing director of Harland & Wolff, Limited, Belfast, and Mr. Henry Robb, chairman and managing director of Henry Robb, Limited, Leith, were also appointed vice-presidents.

Mr. George Hilton, managing director of Scotts' Shipbuilding & Engineering Company, Limited, Greenock, was elected chairman of the Conference and Works Board, and Mr. Thomas McIver, a director and general manager of Swan, Hunter, & Wigham Richardson, Limited, Newcastle-upon-Tyne, was elected vice-chairman.

ALFRED HERBERT, LIMITED, machine-tool makers, of Coventry—Negotiations for the acquisition of I. L. Berridge & Company, Limited, have been taking place on the terms that the Berridge subsidiary and associated companies and the Whetstone and Alford factories are excluded by transfer to C. S. Martin Holdings, Limited, and C. S. Martin, Limited. Pending completion of the agreement arrangements have been made for closer liaison between the two companies in the works management of the Berridge factories at Sanvey Gate and Wigston.

Iron and Steel Trade

RISE IN STEEL STOCKS

Record Rate of Usage

PRELIMINARY results of the census of users' stocks of steel taken at the end of September, the Iron and Steel Board states, suggest that the stocks of finished steel rose by 200,000 tons, or about 5 per cent., in the third quarter of the year. The increase followed rises of 6 per cent. and 8 per cent. in the first and second quarters. Steel sheet again contributed the greater part of the stock rise, accounting for 120,000 tons in the third quarter. Stocks of sheet have risen by 263,000 tons, or 63 per cent., during the first three quarters of the year.

On the basis of the preliminary stock figures the usage of steel in the home market during the third quarter is estimated at 3,860,000 tons (seasonally corrected). This continues the record rate of usage achieved in the second quarter and represents an increase of 11 per cent. over the previous best third quarter, reached in 1957.

Growth in total deliveries of steel from home production to the main groups of using industries over the past three years reflects the expansion of the motor vehicle, building, wire, and electrical engineering trades. By contrast the requirements for the mines, railways, and shipbuilding yards have fallen, while the needs of mechanical engineering have remained virtually unchanged.

Pig-iron

In spite of a fair amount of pressure on the foundries, especially from the heavy engineering, machine-tool, and power and electrical plant trades, makers are able to supply all the pig-iron needed and there is no difficulty in obtaining the low phosphorus irons.

Producers of the high phosphorus irons, used particularly by the light foundries catering for the domestic utensil trade, can supply up to maximum requirements as the foundries have capacity to spare.

Ferro-alloys

Demand for ferro-tungsten shows little change, but there is a steady request for ferro-vanadium, while ferro-molybdenum is receiving reasonable support. Both the high and low carbon grades of ferro-chrome are active and the major grades of ferro-silicon continue to attract strong attention.

Ferro-titanium is in fair request, ferro-niobium is active again and the call on chromium metal is at a reasonable level.

Semi-finished Steel

To the extent of the labour available, the re-rollers are obtaining maximum outputs and the demand for small bars and light sections is well maintained.

The shortage of carbon and alloy steel billets has not yet been overcome but most of the mills have sufficient supplies of steel semis in the mild steel grades.

Finished Steel

Orders are still being placed for extended delivery, except in special cases of unusual sizes and where tonnage is required to make up a rolling. All kinds of plates maintain their demand and it is "extended delivery" for the lighter grades. The demand for cold reduced sheets has fallen away, but makers have existing orders on hand sufficient to keep them fully occupied for several months.

Both flat and corrugated galvanized sheet and cold rolled strip can be disposed of easily, but an improvement in the demand for hot rolled strip and black sheets would be welcomed by the makers.

Cementation Company's Dividend Prospects

SUPPORT for the view that answers to questions by the chairman (Mr. A. R. Neelands) had not given them one tangible reason why the company should have incurred such a big loss was forthcoming from a number of shareholders at the end of the annual meeting of the Cementation Company, Limited, in London on Wednesday. The chairman refused to put the report and accounts to the vote; he claimed that the Companies Act only required the shareholders to receive and consider them.

Mr. Neelands was asked why the board had not issued an interim statement on the position of the company for the year ended March 31, 1960. He said it was the board's opinion that the overall results could not have been forecast with sufficient accuracy to warrant a statement being made. It had never been the policy of the board to issue interim statements, but it was its future intention, in view of the protests from many shareholders and the Press, to issue conjectural statements.

Referring to the company's prospects, Mr. Neelands did not think it would make even as much "site" profits as it had done during the year under review, but he thought it would have a larger residual balance. He did not expect that the company would be able to pay a dividend for the current year, but was very hopeful that payments would be resumed for the year to March, 1962.

THE National Coal Board is to provide piped television for residents at Abertillery to combat interference caused by a large excavator working on a nearby open-cast site.

Appointments

General Sales Manager for Mavor & Coulson

MR. R. M. CLIVE

MAVOR & COULSON, LIMITED, makers of mining machinery, coalcutters, conveyors, etc., of Glasgow, announces the appointment as general sales manager of MR. ROBERT M. CLIVE.

Mr. Clive, who was educated at Oundle, Cambridge University, and Sheffield University, was manager of Brookhouse Colliery in No. 1 (Worksop) Area of the North-Eastern Divisional Coal Board, before joining the Mavor & Coulson organization in 1950. He was a member of the Sheffield mining staff of the company for seven years before taking up the appointment in 1958 of district manager in Lancashire and North Wales for sales and service of underground equipment. As general sales manager he will operate from the head office of M&C in Glasgow and will move there early in the New Year.

Mr. A. A. TAYLOR has been appointed secretary of Sterling Metals, Limited, in succession to the late Mr. T. Barker.

Mr. J. W. JACKSON has been appointed manager of the Dublin office of Associated Electrical Industries, Limited, in succession to Mr. P. L. Edwards, who has retired but will continue for a time as consultant.

Mr. LAURENCE J. FORD, previously chief development engineer of Stanley Works (G.B.), Limited, has been appointed chief engineer to bring his title into line with the wider responsibilities which he has carried for some time.

Mr. A. EATON, who has been with Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield, for 22 years, latterly as East Midlands representative, has been appointed a field assistant sales manager for the Redfyre Products department.

Because of the increase in the volume of business for Worssam products, this part of Vickers-Armstrongs (Engineers), Limited, has been made into a division and Mr. E. W. FRENCH appointed manager with Mr. L. F. WORSSAM sales manager.

Mr. FRANK DESMOND ADAMSON, senior assistant surveyor at Skiers Spring Colliery, a branch of Rockingham Colliery, Hoyland (Yorks), has accepted a post with an American firm engaged on oil exploration in Nigeria and leaves in December. He has been with the National Coal Board for seven years.

LONG-SERVICE AWARDS are to be presented to 312 employees and pensioners of Geo. Salter & Company, Limited, makers of springs, spring balances, etc., of West Bromwich, on November 28. Mr. Tom Ward has 60 years' service to his credit and the total awards represent 12,131 years of service.

Ore Chartering

ALTHOUGH a rather better volume of miscellaneous business has been effected, there is no material change in the undertone of the markets and from certain areas tonnage appears to be in excess of the demand.

Only a small enquiry is circulating from North Africa and/or Spain to the Continent, but recently Benisaf/Ymuiden or Amsterdam fixed about 7,800 tons at 23s. 6d. for November and La Goulette to Gdynia, Gdansk or Szczecin at 22s. f.i.o. for prompt loading. Savona/Rotterdam or Dordrecht reports about 5,000 tons of residues for late November at 23s. 6d. f.i.o. and trimmed. Further tonnage has been fixed for Poti to Calais or Boulogne for the first half of November at 32s. f.i.o. and trimmed for 8,000 tons min./max. and Abou Zenima/Ymuiden or Amsterdam 9,800 tons for November at 35s. 6d. Other ore loading areas have little to report but Lulea recently reported 8,000 tons at 8.25 kr. f.i.o., Malm 9,500 tons of concentrates for November at 12s. f.i.o., and Narvik 9,500 tons at 14s. 6d. f.i.o., all for discharge at Gdynia, Gdansk, or Szczecin. Vitoria/A-H range secured 9,800 tons for December at 41s. on gross terms.

There has been a resumption in bauxite chartering from West Africa—Takoradi/Burntisland reporting 7,000 tons for the end of December at 48s. Itea/London recently paid 31s. for part cargo of 4,900 tons for prompt/early November delivery, and 9,700 tons for the second half of November has been fixed from Toulon/Newport at 21s. Further tonnage has been taken up from Casablanca to South China at 54s. f.i.o. and trimmed with option of Shanghai at 55s. and a second half of November 12,000-tonner has also given the option of Tsingtao at 56s. f.i.o.

BSA PAYS CENTENARY BONUS

SPECIAL capital dividend of 5 per cent. is to be paid by the Birmingham Small Arms Company, Limited, to commemorate its centenary. The dividend for the year ended July 31, 1960, excluding this payment, is raised to 17½ (12½) per cent. with a final of 11½ per cent. It is proposed to make a one-for-two scrip issue to holders registered on December 16.

Group net profit for the year rose to £1,663,748 from £1,210,522, after tax of £1,754,800 (£1,335,976). The sub-division of the £1 ordinary units into 10s. units and the adoption of new articles in modern form are also proposed.

Neepsend Steel & Tool Converts to Oil

ALL coal-fired boiler plants at Neepsend Steel & Tool Corporation, Limited, Sheffield, have been converted to oil. This, states the chairman, Sir Stuart Goodwin, follows the success achieved in replacing the coal-fired furnaces with gas oil-fired furnaces of the company's own design and manufacture. The result, he reports, has proved "remarkable" both in consistency and economies in cost, while the resultant cleanliness in the forges and mills has ensured conditions for the workers which were unknown before.

The conversion of the furnaces, which was started two years ago, is expected to be completed by March, 1961.

More Research Needed

MACHINE-TOOL INDUSTRY'S SHORTCOMINGS

MASS-PRODUCTION in the machine-tool industry as an answer to Russian competition is rejected by a sub-committee of the industry's advisory council in its report published last Friday. The report's main conclusion, however, is that unless the industry more than doubles its expenditure on research and substantially increases, as a matter of urgency, its recruitment of qualified engineers there is a danger that Britain will have to rely still more heavily on imported machine tools and that the UK share of the export trade in machine tools will continue to decline.

A report last year on the industry in western Europe, made for the European Productivity Agency by Prof. Seymour Melman, contained a number of criticisms of the British industry. The Machine Tool Advisory Council was appointed in December, 1959, to consider these criticisms and the report now published is the work of a sub-committee of the council.

While acquitting the industry of most of Professor Melman's criticisms and rejecting most of his suggestions, the sub-committee has produced a number of criticisms and practical proposals of its own.

Industry Now More Receptive

It believes the industry over-concentrates on the production of standard machine tools, which "accounts for its shrinking share of world trade;" it lacks development effort and standardization of machine-tool parts which are of primary importance to users; it places too much dependence on licensing agreements; it has a shortage of research staff; and it has failed in the past to explain itself to the public.

Commenting on the report, a spokesman for the Machine Tool Trades Association said that the spirit of the industry was now much more receptive to ideas of increased expenditure on research and of using the best brains obtainable. There was now more co-operation between manufacturer and user and manufacturer and manufacturer than ever before.

The MTTA has already set up a Machine Tool Industry Research Association with the objective of doubling the research effort by 1964 and it has appointed an education officer to correlate and improve educational facilities within the industry.

The original members of the sub-committee were:—Mr. R. W. Asquith, joint managing director of William Asquith, Limited, and a director of the Asquith Machine Tool Corporation, Limited; Mr. W. J. Carron, Amalgamated Engineering Union; Col. C. W. Clark, chairman and joint managing director of Alfred Herbert, Limited; Mr. R. C. Giggins, a director of the General Electric Company, Limited; Mr. J. G. Lloyd, a director of Vickers-Armstrongs (Engineers), Limited; Mr. R. D. G. Ryder, Thomas Ryder & Son, Limited; Mr. A. Siddall, Joseph Lucas (Electrical) Company, Limited, Mr. E. T. Grainger, Mr. J. B. L. Munro, and Mr. K. D. Rogers (Board of Trade).

BRITISH ROAD SERVICES, and not British Railways (as stated in our issue of October 28), adjusted its charges from November 1 in order to obtain an overall additional revenue of 10 per cent. The last general increase in rates was made in May, 1957.

Engineering Orders Rise

NEW orders received by the engineering industry in July and August were at a higher rate than in the second quarter of the year and well above 1959. With deliveries falling seasonally in the holiday months for engineering and electrical goods, locomotives and railway track equipment, carriages and wagons, and heavy commercial vehicles, the gap between net new orders and deliveries widened and orders on hand, mainly for capital goods, increased substantially.

At the end of August the value of orders on hand was 5 per cent. more than at the end of June—in the second quarter they had increased by 2 per cent. and in the first by 8 per cent. Export orders on hand were increasing at a lower rate in July-August than home market orders. Net new orders have declined this year and in July-August were 18 per cent. more than a year earlier, having changed little since the end of 1959.

Staveley Coal & Iron's Satisfactory Order-book

PRESENT financial year of the Staveley Coal & Iron Company, Limited, opened with satisfactory order-books and, coupled with the benefits accruing from new acquisitions, it would be reasonable to look forward to a further increase in profits, states Mr. J. P. Hunt, the chairman. It is proposed to increase the capital to £10,000,000 by the creation of 3,229,288 £1 shares.

An analysis of the profit of £1,675,843 (£325,962) for the year ended June 30, 1960, shows that general engineering and foundries accounted for £713,000 (£351,000), or 43 (26) per cent.; salt lime and allied products for £433,000 (£293,000), or 26 (22) per cent.; machine tools for £424,000 (£574,000), or 25 (42) per cent.; and investment increase for £105,000 (£131,000) or 6 (10) per cent.

AS PART OF an expansion programme, Ames Crosta Mills & Company, Limited, sewage and trade effluent purification engineers, of Heywood (Lancs) has acquired part of the land and buildings forming the Sun Ironworks, Heywood, of William Smith & Bros., Limited, textile engineers, loom builders, and ironfounders. Part of the Ames Crosta Mills production, including heavy sheet metal work and steel work and fabrication is to be transferred from the Moss Iron Works to the new site, but the Moss Iron Works will continue in production.

No "Ghost Towns" for Scotland

SUGGESTION that the "ghost towns" of the Californian goldfields must inevitably have their counterparts sooner or later in the derelict villages of the Scottish coalfields was put forward by Prof. T. Neville George, Professor of Geology at Glasgow University. He was speaking at the recent three-day study group arranged as a symposium by the Scottish Council (Development and Industry).

Mr. R. W. Parker, chairman of the Scottish Divisional Coal Board, challenged Prof. George's assertion at the symposium, and the Divisional Board has also issued a statement commenting on the symposium insofar as the coal industry is concerned.

Replying to one speaker's contention that "the demand for electricity was increasing so rapidly that an alternative fuel to coal would be essential in 10 to 15 years time, before nuclear energy has replaced it," the board points out that its plans for coal production were prepared after consultation with the electricity authorities. Consumers could rest assured that there would be coal available to produce the amount of electricity required for many years to come.

Another speaker prophesied that consumers would be unable to obtain the smokeless fuels they required to comply with the terms of the Clean Air Act. Such critics were reminded that the Secretary of State for Scotland in approving a smoke control area was required to satisfy himself that such suitable fuels would be available. Smokeless fuels such as gas and electricity were readily available in all areas likely to be affected; there were various smokeless solid fuels for the open fire, and the NCB was engaged on the development of special new fuels suitable for open grates.

The most unfortunate suggestion, the board thinks, was that of Prof. George. "It is true that collieries in time become exhausted and have to close, but the circumstances in the Scottish coalfield differ entirely from those that led to the ghost towns of California," it is maintained. People in Scotland need not expect a parallel development and the Coal Board has fortunately been able to re-employ the great majority of miners made redundant by closures—in large measure in collieries near their homes.

Forecast that over the next 10 years Scotland's energy requirements would in the main continue to be met by maintaining or even slightly increasing the present level of coal production was given in the paper "Energy—Resources and Utilization," presented by Mr. J. Guthrie Brown and Mr. J. K. Hunter, Sir Alexander Gibb & Partners, consulting civil engineers, of London, S.W.1.

Prof. A. S. T. Thomson, head of the Department of Mechanical, Civil, and Chemical Engineering, Royal College of Science and Technology, Glasgow, felt that Scotland's growing demand for fuel and power might require the appointment of a Minister of Energy "to co-ordinate the utilization and conservation of resources."

The high efficiency and relatively low capital cost of the very large new coal-fired electrical generating stations would, he thought, make it more difficult for nuclear energy stations and the more expensively sited hydro-electric stations to compete.

JAMES G. CARRICK & COMPANY, LIMITED, metalworkers, of Glasgow, has applied for planning permission to erect a new factory at Kirkintilloch.

European Coal Output

THE appended figures relating to coal output and imports are taken from statistics issued from Geneva by the Coal Committee of the Economic Commission for Europe.

Tonnages are metric, and the number of underground workers employed relates approximately to the end of the month.

TABLE 1.—*European Coal Output (Metric Tons) and Employment.*

Country.	Output.		Underground employment.	
	August, 1960.	July, 1960.	August, 1960.	July, 1960.
Belgium	1,815,000	1,514,000	79,000	81,000
France	4,035,000	4,240,000	129,000	130,000
Italy	63,000	60,000	—	—
Netherlands ..	1,016,000	1,015,000	28,000	29,000
Poland	—	8,281,000	—	212,000
United Kingdom ..	11,996,000	12,104,000	475,000	478,000
Spain	—	1,103,000	—	—
Western Germany ..	11,720,000	11,508,000	—	303,000

TABLE 2.—*European Solid-fuel Imports in August, 1960, with Figures for July, 1960, shown in Brackets (Metric Tons).*

Importing country.	Coal and patent fuel.	Coke.	Lignite and brown coal briquettes.
Austria	336,000	60,000	56,000
	(326,000)	(59,000)	(52,000)
Belgium	330,000	19,000	9,000
	(387,000)	(18,000)	(7,000)
Denmark	327,000	92,000	12,000
	(313,000)	(77,000)	(18,000)
Finland	235,000*	12,000*	—
	(269,000)	(5,000)	(—)
France	805,000	398,000	37,000
	(897,000)	(413,000)	(36,000)
Greece	8,000	—	—
	(3,000)	(1,000)	(—)
Eire	115,000*	—	—
	(97,000*)	(1,000)	(—)
Italy	794,000	17,000	17,000
	(995,000)	(11,000)	(16,000)
Luxembourg	19,000	341,000	11,000
	(21,000)	(340,000)	(11,000)
Netherlands	487,000	17,000	21,000
	(685,000)	(25,000)	(16,000)
Norway	42,000*	18,000*	—
	(48,000*)	(23,000*)	(—)
Portugal	26,000	7,000	—
	(11,000)	(2,000)	(—)
Sweden	137,000	174,000	1,000
	(129,000)	(231,000)	(—)
Switzerland	220,000	76,000	18,000
	(199,000)	(75,000)	(14,000)
United Kingdom	—	—	—
	(—)	(—)	(—)
Western Germany	644,000	31,000	381,000
	(551,000)	(38,000)	(436,000)

South Wales Pits Want More Qualified First Aid Men

SHORTAGE of qualified ambulance men in many South Wales pits was causing much concern, it was stated at the annual presentation of awards of the Abertridwr (Mon) St. John Ambulance Division. In many cases there are enough men to carry first aid boxes but the men are not qualified.

The problem, it was said, was partly caused by the general drift from the mines, especially of the older more experienced men, and there were few recruits coming forward for ambulance training. Another problem in some South Wales pits was the distribution of the qualified men.

DEVELOPMENT of the LUMP SHEARER

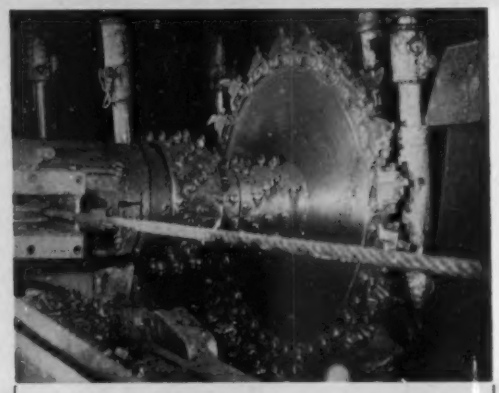


FIG. 1.—DISTRIBUTION OF PICKS ON THE DISC OF THE LUMP SHEARER.

APPLICATION AT PYE HILL COLLIERY

By G. F. MEE and F. W. SMITH

This paper, presented to the Midland Branch of the National Association of Colliery Managers on November 16, 1959, discusses the reasons for the need to modify the Anderton shearer. The development of the lump shearer and its installation at Pye Hill Colliery, No. 5 Area, East Midlands Division, NCB, are described and the operating results given. Suggestions are also made by the authors, who are directed practical trainees, for the wider application of this recent development.

IN its original form, the Anderton shearer was introduced at a time when the coal industry was faced with the problems of increasing bulk output and combating the effects of a decreasing labour force. The increases in output per man-shift which these machines made possible were startling, but subsequent events indicated that modifications were necessary to increase the percentage of round coal produced by them.

The statistics compiled by the National Coal Board relating to mechanized output show that during the second quarter of 1958, 320 Anderton shearers were in use, producing 7,210,639 tons of coal. For the same period, the output produced from all mechanized longwall faces was 15,681,453 tons. Thus, the Anderton shearer is responsible for 46 per cent. of the total national mechanized longwall face output.

This machine will be the mainstay of the board's mechanization programme for some years to come, but it is accepted as having contributed to the present position of large stocks of small coal. Consequently, any improvement in the size of coal which the machine produces will assist.

The amount of coal on stock from June, 1958, to June, 1959, in No. 5 Area, East Midlands Division, NCB, is given in Table 1.

TABLE 1.—*Stocks of Washed and Untreated Smalls.*

	June, 1958.	December, 1958.	June, 1959.
	Tons.	Tons.	Tons.
East Midlands Division ..	2,399,621	4,180,552	6,178,707
No. 5 Area	511,926	840,453	1,239,070

The wide and successful application of the Anderton shearer loader proved that it had a considerable number of advantages over, and was more flexible than other power loaders. The problem that confronted mining engineers was—could the machine be modified to produce a higher percentage of round coal without detracting from its performance?

The authors believe that the lump shearer, developed by Mr. T. Wright, No. 5 Area general manager, and Mr. A. Stones, undermanager of Sutton Colliery, No. 4 Area, East Midlands Division, has solved this problem. It is also felt that its wider application along the lines suggested could make a marked contribution towards halting

the rising trend in the stocks of small coal. The original loaders in common use sheared the coal by means of cutter picks mounted on the perimeter of a series of discs which were keyed to a horizontal shaft. Many experiments were carried out to reduce degradation and produce a larger percentage of round coal. Results from these experiments showed that a considerable amount of degradation was caused by a grinding action taking place on the coal which was recirculated by the drum instead of being thrown clear.

In order to produce a better engineering product and to increase the stability of the machine, a smooth-faced drum was designed which has almost replaced the discs on the conventional type of shearer loader. This tended to aggravate the degradation problem, but was overcome to a certain extent by the application of paddles to the drum.

In the early stages, the number of discs on the shaft was varied, mainly to obtain the optimum depth of web which could be removed. The idea of the lump shearer was formulated with the original disc machines in mind, entailing the removal of all but the face-side disc and equipping the horizontal shaft with picks. This gave rise to certain problems relating to machine and plough design. It was considered necessary to have a disc of sufficient diameter to cut a free face from roof to floor. The large disc would give ample clearance between the flights of the conveyor and the gearbox of the machine. The diameter of the disc at Pye Hill Colliery was 52 in. over the picks, giving a pick speed of 740 ft./min., which has proved successful on previous loaders.

The mechanical strength required to prevent distortion of the single disc was considered and from past experience with multiple discs on the original machines, a disc 48 in. dia. and 1¼ in. wide was manufactured from mild-steel plate. Ample clearance between the disc and the coal was essential since such a large rubbing surface was involved and it was desirable for a pick-box of proved design and construction to be used. Links and boxes in conventional chain coal-cutters have proved extremely efficient in the past and these were fitted to the circumference of the disc. The disc was reduced in width around its outer edge, allowing the links of the pick-boxes to fit tightly on it. Each box was attached individually by means of two bolts passing through the holes in the links. On a normal cutting chain these holes carry the pins which hold adjacent links together.

Construction of the Shearing Disc

Before attaching the boxes, the outer edge of the disc was machined at intervals to provide room for adjusting the effective pick length. Twenty boxes were used, this being the maximum number which could conveniently be fitted around the perimeter. This gave four complete sections, each containing one single- and four double-pick boxes, making a nine-line path and a 5½-in. kerf. To provide a strong and efficient method of fastening the disc to the shaft, it was shrunk and welded on to a sleeve which was then keyed to the shaft. This sleeve forms the first of four such sleeves of 1½-in. finished thickness fitted to the horizontal drum shaft to carry mushroom picks. Tapered holes were drilled into the sleeves to carry the picks which were arranged to cut out the full width of the web, providing a 12-in. horizontal kerf at a height of 26 in. from floor level.

On Anderson Boyes shearers, the drum shaft is not at right angles to the machine. In these circumstances with a single disc cutting a vertical kerf at the back of the web, there would be a tendency for a wedging action to take place between the coal and the disc. To obviate this, a gearbox manufactured by Sheepbridge Engineering, Limited, Chesterfield, was used to bring the disc into a line parallel to the conveyor.

Design of the Plough

The plough attached to the machine was double-ended to allow ploughing to take place in both directions. The normal deflecting plate was omitted since it was felt that very little coal would be thrown on to the plough when using a single disc. Prior to shearing, the coal is cut by a conveyor-mounted coal cutter fitted with a swan-neck jib cutting at floor level to provide a floor for the plough to ride on.

It was realized that most of the coal would be ploughed on to the conveyor during shearing operations and that large blocks of coal would have to be dealt with. In view of this, a plough 10 ft. long was designed, the portion in use during ploughing back being 4 ft. The remaining length was used while the machine was shearing. The 6-ft. length of plough was considered essential during shearing operations since it was necessary to provide an efficient lifting and turning movement to the coal if overloading of the shearer motor and staking of the plough was to be avoided.

Considerable difficulty was experienced both in the design and manufacture of the plough since it could not be represented accurately on a plan, even with three elevations. In view of this, accurate cardboard models were made and modified until it was felt that an efficient shape had been obtained. Accurate profiles were then taken of sections along the plough and from these full size templates were made. The actual plough was then built up using these templates.

Fig. 1 illustrates the systems of pick-lacing in the disc and shaft and also the relative positions of the disc and the leading edge of the plough. Fig. 2 shows an elevation of both ends of the plough as seen from the goaf side of the conveyor.

As this was a prototype machine, careful consideration had to be given to the choice of seam in which it could be installed. It was desirable for the machine to operate under conditions where an accurate study of its performance could be made so that any difficulties which might arise from machine design and construction could be assessed. Reasonable geological conditions were required and a good roof parting was desirable so that top coal would fall immediately it had been sheared. This

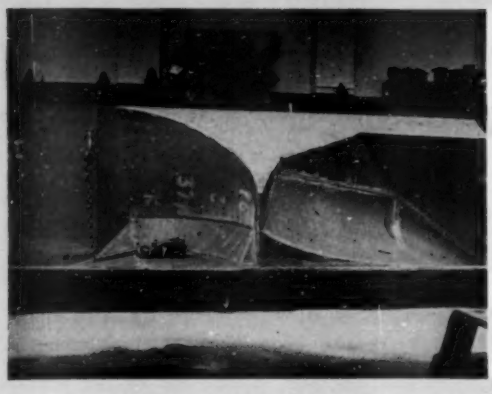


FIG. 2.—ELEVATION OF PLOUGH AS SEEN FROM THE GOAF SIDE OF THE CONVEYOR.

latter feature was necessary to prevent the plough becoming trapped in the vertical kerf. Therefore, the machine was installed at Pye Hill Colliery in the Blackshale Seam on 6's panel where a good roof parting existed and reasonable geological conditions could be expected.

Results from Original Installation

The shortest jib which could be used with the pre-cut machine was 27 in. long and, since the lump shearer had been built to take a 20-in. web, a pre-cut of 6 or 7 in. was left after each cut. Due to the friable nature of the coal this caused an excessive amount of cleaning up on the face side of the conveyor which delayed the machine after it had ploughed back. To obviate this the lump shearer drum shaft was extended and the plough widened to give the same effective web as the pre-cut machine. The design of the plough was also modified to give more effective ploughing and to reduce the amount of time lost due to lumps of coal staking the plough.

From results on this face it became evident that the 50-h.p. motor was too small, but, unfortunately, this was the maximum horsepower which could safely be used in conjunction with the Sheepbridge gearbox. For this reason, a hydraulically hauled British Jeffrey-Diamond shearer was chosen for further installations. On this machine the shaft is at right angles to its centre line, hence the normal gearbox can be used. Therefore, the only alteration necessary to the machine to enable it to be used as a lump shearer is to increase the length of the shaft. The sleeve next to the machine has to be enlarged to remove coal to allow for the passage of a projecting boss on the gearbox.

With the BJ-D machine installed on 17's face in the Blackshale Seam at Pye Hill Colliery, it soon became evident that the slide-bar system of support was delaying the machine and detracting from its performance. Therefore, Dowty Roofmaster supports were installed.

Installation of Pye Hill Colliery

Pye Hill Colliery is situated in Nottinghamshire on the south-western and exposed part of the coalfield, near to the county boundary with Derbyshire. The town of Alfreton lies three miles to the north-west, Ripley three miles to the south-west, and Nottingham 11 miles to the south-east.

Present underground workings are concentrated in the Blackshale Seam and are on the eastern side of the Ironville-Erewash anticline on which the Deep Soft, Deep Hard, Low Main, Yard, and Blackshale seams outcrop. The general direction of full dip is due east at gradients varying from 1 in 6 to 1 in 20.

In the Blackshale Seam, 17's panel lies at a depth of 300 yd. from the surface and is located at a distance of 4,750 yd. from the downcast pit bottom measured along the coal transport roads. The route which the coal takes from the face to the loading point is indicated on the plan in Fig. 3.

The panel is advancing to the rise with the coal on end. The gradient in the conveyor gate is 1 in 18 in favour of the load and the gradient along the face is 1 in 24 in favour of the load. The length of the face cut and loaded is 195 yd., the main-gate stable hole is 16 yd. long and the supply gate stable hole 14 yd., giving a total length of face of 225 yd.

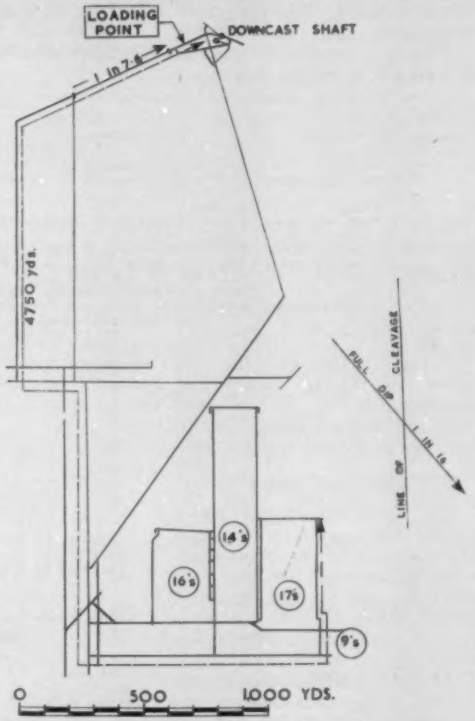


FIG. 3.—PART OF THE BLACKSHALE SEAM WORKINGS AT PYE HILL COLLIERY.

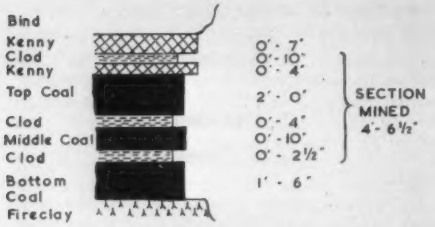


FIG. 4.—SECTION OF THE BLACKSHALE SEAM AT 17'S PANEL.

Thus, the percentage of face length which is power loaded amounts to 86.5 per cent. The section of the seam cut and loaded is 4 ft. 6½ in., including three dirt bands. The total seam section is 6 ft. 7½ in., 7 in. of top coal being left to form a roof parting and 1 ft. 6 in. of bottom coal has to be left down as the underlying floor is a soft fireclay. Fig. 4 gives the section of the seam in detail.

The stable holes are supported by means of "Xplos" 5-ft. link bars and Dowty Monarch hydraulic props. The power-loaded section of the face is supported by Dowty Roofmasters and the waste is caved. The system of support in the main gate stable hole is shown in Fig. 5.

The face equipment required for this system of working is as shown in Table 2.

TABLE 2.—*Details of Face Equipment.*

Location.	Item.	Brief description.
Face ..	Shearer	BJ-D B.10 Magnamatic.
,, ..	Pre-cut machine	BJ-D Ace, swan-necked jib, effective cut 2 ft. 3 in.
,, ..	Plough	Modified.
,, ..	Armoured conveyor	Crawley, head-and-tail drives (single), 40 h.p. each.
,, ..	Conveyor signals	Davis, twin-push switch type.
,, ..	Haulage ropes	2 by ¾ in. ordinary lay.
Stable holes	Coal-cutter ..	BJ-D Ace, 5 ft. 6 in. cut.
,, ,,	Drills	Siemens-Schuckert 1.25 h.p.
	Haulage winches	Reliance type, one in each stable hole for shearer and pre-cut machines.

It will be seen that the items of equipment in excess of normal shearer requirements are the modifications to the machine itself and a pre-cutting machine with its associated haulage gear.

Face Operations

The face is worked by a double-shift system on days and afternoons. At the commencement of cutting, the two face machines are in the positions shown in Fig. 5. Both machines ride on the conveyor, which lies within 4 in. of the coal face. The pre-cut machine commences cutting, taking a 7½-in. kerf and an effective cut of 2 ft. 3 in. at floor level. This machine cuts the floor on which the plough of the lump shearer rides. The shearer commences cutting when the required distance between the two machines has been reached. This distance varies according to conditions as the coal has to be allowed to "work" itself sufficiently before it is sheared and experience on 17's panel has shown that this distance ranges from 4 to 5 yd.

On reaching the supply-gate stable hole after having taken a web of coal 2 ft. 3 in. deep through the face, the whole of the pre-cut machine and two-thirds of the lump shearer enter the stable so that the leading edge of the disc cuts out. Picks are changed in the pre-cut jib if necessary and the jib is then locked in its flitting position over the run of the conveyor. This is illustrated in Fig. 6. The shearer then flits back to the main-gate stable hole, ploughing coal on to the conveyor in the normal way and is followed by the pre-cut machine. On reaching the main-gate stable hole, the plough and shearer enter, leaving sufficient space between the shearer controls and the buttock to allow the pre-cut jib to be slewed into its cutting position.

The remaining length of the conveyor is then snaked over to the face and the above cycle of operations is repeated. Haulage of the machines through the face is effected by means of two ¾-in. dia. ordinary-lay wire ropes, one for each machine. These ropes are attached to winches at either end of the conveyor and to prevent the shearer haulage rope from fouling the pre-cut jib, each end of the pre-cut machine is fitted with tubes through which the shearer haulage rope passes.

Manpower Deployment

The face is worked on two shifts and the deployment of manpower is as shown in Table 3.

Manpower chargeable to district such as gate-belt extending, dinting, etc., has been omitted from the table. The steel checker, although charged to the face, does not spend the whole shift on this face. The system of support adopted in the stable holes allows five shears to be taken in 24 hr. without the statutory maximum distance of 21 ft. between the coal face and the edge of the ripping lip being exceeded. Ripping work in the main gate, other

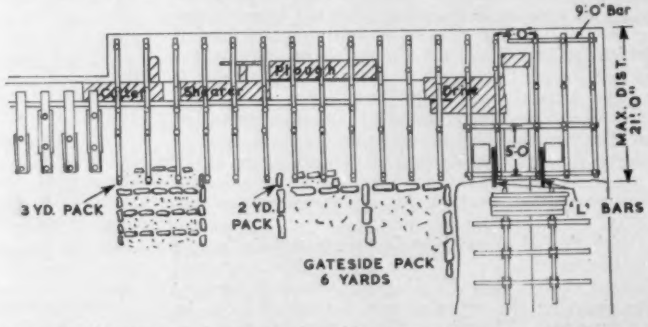


FIG. 5.—SYSTEM OF SUPPORT IN THE MAIN-GATE STABLE AT 17'S PANEL.

TABLE 3.—*Manpower Deployment.*

Job specification.	Days.	A/noons.	Nights.
Lump shearer	1	1	—
Cableman	1	1	—
Pre-cut machine	1	1	—
Cableman	1	1	—
Plough attendant	1	1	—
Stable holes	8	8	—
Waste operators	3	3	—
Exemption packs	2	2	—
Cleaning-up face	1	1	—
Chargeman	1	1	—
Main-gate rippers	—	—	5
Left-gate rippers	5	—	—
Face switches	1	1	—
Linesmen	1	1	—
Dinting main gate	1	—	—
Steel checker	—	1	—
Supplies	1	1	—
Shotfirers	1	1	—
Total	30	25	5

than on the night shift, is therefore unnecessary.

A large proportion of the total shift time is spent in travelling inbye and outbye. Time is also lost during the shift due to conveyor stands. These are caused by the shaft capacity being below the loading rate at peak periods.

Exhaustive time studies have been carried out showing that, of the total shift time, composed of 7½ hr. working time and 30 min. winding time, travelling inbye and outbye takes 95 min., preparing and finishing work 10 min., snaptime 15 min., and conveyor stands 69 min., giving a total of 189 min. non-working time. Consequently, the time available for work in the eight-hour shift is 291 min.

The optimum time required to complete a cycle was found to be 116 min. Thus, the optimum performance per shift is:

$$\frac{291}{116} = 2.5 \text{ shears or } 487 \text{ yd.}$$

Norm performance (75 per cent. optimum)=1.87 shears=365 yd.

Negotiated norm=1.75 shears=343 yd.

Excluding conveyor stands the performance figures would be optimum, 605 yd., with a norm of 453 yd.

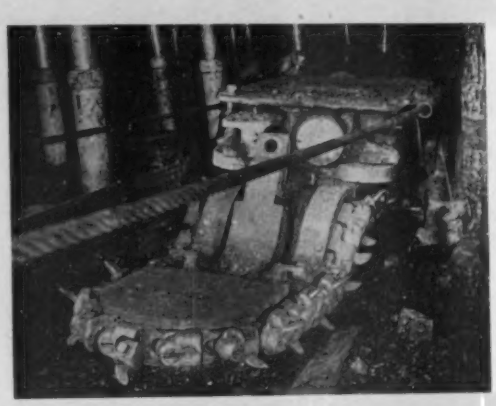


FIG. 6.—JIB OF PRE-CUTTER LOCKED OVER THE CONVEYOR.

The cycle time includes delays from attention to pre-cut machines in the stable holes, awaiting pre-cut machine in main-gate stable holes, snaking machine and conveyor to cutting position, etc. It is interesting to note that of the 116 min. required for a complete cycle only 43 min. are spent in actual cutting.

The individual cutting and flitting speeds of the two machines are given in Table 4.

TABLE 4.—*Machine Speeds.*

Machine.	Operation.	Speed (ft./min).
Lump shearer	Cutting	13.67
Lump shearer	Flitting	21.12
Pre-cut	Cutting	14.55

Early in July, 1959, a request for a further machine study was made. The main reason for this request was the difficulty in achieving the agreed performance.

When studies were taken in February, 1959, a fault on the face was approximately 50 yd. from the left-hand stable hole and it was observed that the machine could attain high speeds from the main-gate stable hole to the fault, but relatively slower speeds between the fault and the left-hand stable hole. In these circumstances an average cutting speed of 13.67 ft./min. was obtained.

During the July studies, however, the fault was located at a distance of 60 yd. from the main-gate stable hole and again machine cutting speeds from the main gate to the fault were very good, but from the fault to the left-hand stable hole the

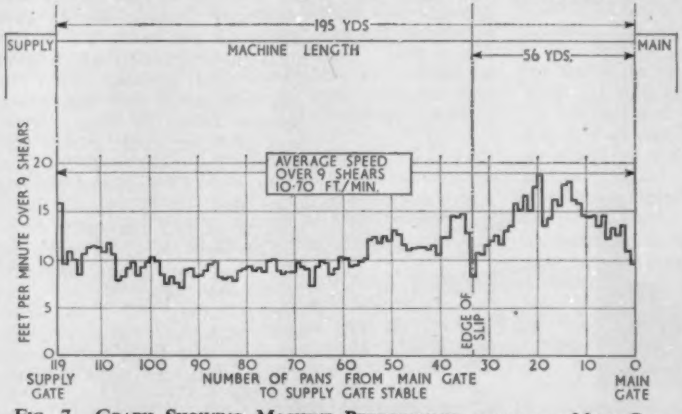


FIG. 7.—GRAPH SHOWING MACHINE PERFORMANCE FROM THE MAIN GATE TO THE SUPPLY-GATE STABLE.

speeds dropped considerably. In these circumstances an average cutting speed of 10.70 ft./min. was obtained, which meant that the average cutting speed had fallen by 2.93 ft./min. over the cutting distance.

Fig. 7 shows the average machine cutting speeds taken over nine complete shears and illustrates how the speeds fluctuate on either side of the fault.

Increased cutting time and additional conveyor stands reduced the 75 per cent. optimum norm performance to 1.629 shears or 317.5 yd.

Table 5 gives details of output per manshift, manshifts worked and saleable output during first eight months of 1959.

TABLE 5.—*Productivity.*

Week ending	Expected pithead o.m.s.	Saleable o.m.s.	Manshifts worked	Saleable output.
	(Cwt.)	(Cwt.)		(Tons.)
10.1.59 ..	208.1	136.8	437	2,989.1
24.1.59 ..	194.7	133.3	421	2,806.0
*7.2.59 ..	357.8	235.8	285	3,360.1
21.2.59 ..	459.7	294.3	279	4,070.5
7.3.59 ..	367.4	227.3	293	3,329.9
21.3.59 ..	365.9	232.0	277	3,218.0
4.4.59 ..	376.4	243.4	232	2,830.0
18.4.59 ..	363.5	227.4	304	3,455.0
2.5.59 ..	315.1	188.1	338	3,175.0
16.5.59 ..	277.2	177.6	316	2,808.0
30.5.59 ..	329.0	207.5	311	3,222.0
13.6.59 ..	308.7	199.9	299	2,991.0
27.6.59 ..	306.7	195.7	273	2,669.0
11.7.59 ..	335.9	200.9	306	3,069.0
25.7.59 ..	359.2	218.7	286	3,122.0
1.8.59 ..		Pit holiday week		
8.8.59 ..	273.6	182.7	231	2,116.0
22.8.59 ..	336.8	203.0	302	3,067.0

* Dowty Roofmasters installed.

The section of the seam mined contains three dirt bands with a total thickness of 1 ft. 4½ in. There is, therefore, a large difference between the expected pithead o.m.s. and the saleable o.m.s.

To give a comparison of products, sizing tests have been carried out on three mechanized faces, namely: 14's panel Blackshale—trepanner (one test); 17's panel Blackshale—lump shearer (two tests), and 41's panel Blackshale at Denby Hall—normal shearer (one test). It was necessary to carry out the test on a conventional shearer at Denby Hall as there were no machines of this type in use at Pye Hill. Total samples of approximately 6 tons were obtained in each test by taking a minimum of 20 increments from the gate conveyors.

Over 6-in. material was hand sorted at the sampling points into coal and dirt to eliminate excessive breakage in transit to the scientific department. The 6-in. to 0 material was bagged and taken out of the pit on the normal coal transport system and hand screened into the following sizes:—4-in., 2-in., 1-in., ½-in. (round-hole screens); ¼-in. 30 B.S.S. (square mesh sieves).

The over 2-in. fraction was hand sorted into coal and dirt, while sizes below 2 in. were separated at a specific gravity of 1.6. Each of the resultant fractions was analyzed for ash content on a dry basis. The results of these three tests are shown in the histogram in Fig. 8. The lump shearer produced over 31 per cent. of +2-in. coal, compared with 46 per cent. for the trepanner and just over 10 per cent. for the conventional shearer.

Results Compared

The ash contents (dry basis) of the outputs in this size range from the lump shearer and the trepanner were similar at 33.0 per cent. and 30.6 per cent., respectively, but that of the conventional shearer product was considerably higher at 50.9 per cent. Of the +2-in. raw coal produced by the lump shearer and the trepanner, about 65 per cent. was clean coal, while only just over 40 per cent. of the conventional shearer product was clean coal. In the 2-in. to ½-in. size fraction, the three machines produced similar amounts of raw coal, varying from approximately 29 per cent. for the trepanner to 33.5 per cent. for the lump shearer.

The lump shearer produced more ½-in. to 0 raw coal than the trepanner (35.2 per cent., against 24.5 per cent.), but considerably less than the conventional shearer, which gave 57.3 per cent. In this size fraction 65 per cent. of the lump shearer product was clean coal, which is similar to that for the conventional shearer, which gave about 68 per cent., but is less than the trepanner, which gave 74 per cent. of clean coal. The ash content of the total r.o.m. product from the lump shearer was 29.7 per cent., which was higher than that of the trepanner at 25.5 per cent., but less than that of the conventional shearer at 32.7 per cent.

The yield of clean coal per 100 tons of r.o.m. material from the lump shearer was approximately 67 tons, from the trepanner approximately 72 tons, and from the conventional shearer approximately 64 tons.

When assessing the results from these tests it must be realized that only one test was

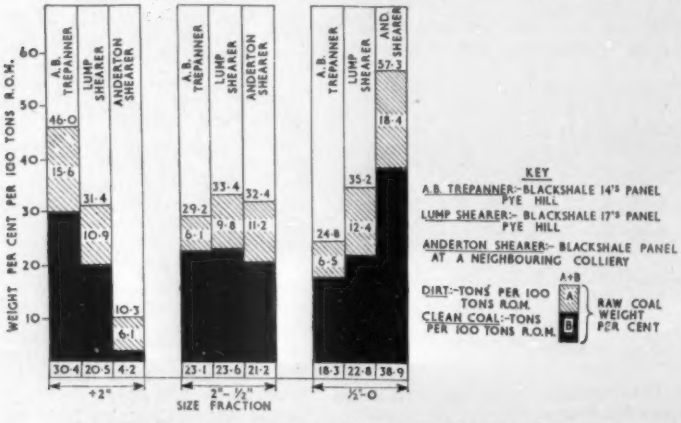


FIG. 8.—HISTOGRAM OF THE YIELD/TON RUN-OF-MINE COAL.

carried out on the trepanner, but similar tests carried out at other collieries on trepanner faces give an average of over 40 per cent. round coal and so confirm the findings of this test. Similarly, only one sample was taken of the products of the conventional shearer in the Blackshale Seam and this at a neighbouring colliery. However, tests carried out on this type of machine in the same seam in another Area, and also in other seams in No. 5 Area, gave results of the same order as the ones used in this paper. The results for the lump shearer are the average of two tests and, in this case, work carried out on a similar machine working in the same seam at the same colliery gave results which were in agreement with the ones given.

In all cases, the worked section of the Blackshale Seam was sufficiently similar to make valid any comparison of results. Detailed studies were not made for environmental conditions and, therefore, an assessment of the effects of introducing this type of power loader could not be made. The figures quoted are the averages of routine samples.

Intake air travels up the conveyor gate to the face and the direction of the air current is the same as the direction of cutting. The volume of air passing along the face is approximately 10,000 cu. ft./min. and the methane content averages 0.3 per cent.

The pre-cutting machine is provided with arrangements for wet cutting and three readings of dust concentration taken by means of the thermal precipitator over a period of 28 days gave an average of 490 particles/cu. cm. in the pathogenic range (1-5μ). This figure is well within the approved standard and visible dust is practically negligible. The low value of the dust concentration can, to some extent, be ascribed to the moisture content of the coal, which, at 9.5 per cent., is rather high.

With this machine there is no necessity to have the disc rotating in an "up and over" direction in order to throw coal on the plough. Therefore, tests must be made on each new installation to find the most suitable direction. On the two installations at Pye Hill it has been found that rotating the disc in a "down and under" or anti-clockwise direction gives satisfactory results. This is not necessarily true for all conditions, but would be advisable on a face where the coal does not part readily from the roof if the stability of the machine were to be maintained.

Varying lengths of shaft have been tried to take webs of coal from 20 in. to 30 in. wide. At the moment, experiences at Pye Hill have shown that a 2-ft. 3-in. shaft is the maximum length which can be used effectively if the balance of the machine is to be maintained.

On a lump shearer installation, the operating distance between the two machines is critical since maximum use must be made of natural forces to keep the load on the lump shearer to a minimum. This distance may vary from day to day, or even during a shift, and is left to the discretion of the machine operator. On 6's panel, advancing to the dip, this distance is approximately 10 yd. On 17's panel, advancing to the rise, 10 yd. between the machines resulted in large blocks of coal falling on to the conveyor and into the path of the lump shearer. To obviate this, the machines were brought closer together and it was found that a distance of approximately 4 yd. was the most suitable.

In the early stages of the lump shearer installation, considerable delays were experienced due to breakage of the shearer haulage rope. These were caused by shock loading of the rope due to:—(1) The ends of the machine on the goaf side fouling the joints of the conveyor spillage plates, which are higher than normal to prevent excessive spillage. This was overcome by attaching brackets with solid steel rollers to the goaf side ends of the machine, which had the effect of easing the spillage plates towards the goaf while the machine passed the joints. (2) Staking of the plough on the cutting operations. This was eliminated by making modifications to the plough itself so that large blocks of coal were transferred to the conveyor in the shortest possible time. Care was also taken to prevent over-snaking of the conveyor. (3) Large blocks of coal falling into the path of the machine. This was overcome by reducing the distance between the machines as discussed earlier.

During the ploughing-back operation, the plough tends to ride away from the conveyor, where the distance between the conveyor and the coal face has been increased due to coal bursting away. This causes the machine to lift itself from the conveyor so that the goaf side guide plate rides on top of the conveyor pans. Little can be done about this problem as the guide plate is of the standard type and cannot be deepened.

Conclusions

The success of the machine at Pye Hill is due, to a certain extent, to the characteristics of the Blackshale Seam in this district. The coal has a friable nature and parts readily from the roof. In seams where this would not occur, the top coal could be brought down by means of pneumatic picks, the loose coal being ploughed on to the conveyor as the machine flits back up the face.

If necessary, an overcutting jib could be provided on the lump shearer to form a free face at roof level. A 125-h.p. motor is now available for use on the face and the authors believe that incorporating a roof-cutting jib on the shearer would not overload the motor even though cutting and ploughing are carried out at the same time. Where it is absolutely necessary, a roof-cutting jib could be provided on the pre-cut machine, but ultimately it is hoped to incorporate all the cutting members on the lump shearer itself.

Tests have proved conclusively that this machine produces a greater percentage of round coal than conventional shearers and there must be many cases where their conversion to lump shearers would prove beneficial. Very little modification of the actual machine is required, and no alterations to the face layout are necessary.

The authors express their thanks to Mr. T. Wright, No. 5 Area general manager, East Mid-

lands Division, NCB, for permission to publish this paper, and to Mr. A. Dennis, group manager, and Mr. M. Godfrey, manager of Pye Hill Colliery, for making available facilities to study the machine in operation. Thanks are also due to the mechanization, method study, scientific, and marketing departments, without whose co-operation this paper could not have been written, and to the planning department and photographic department for the preparation of the slides. Any opinions expressed are the authors' and not necessarily those of the National Coal Board.

DISCUSSION

MR. W. BELFITT commented that it had been stated that wider webs would give an increase in the production of large coal, and asked what steps were being taken in this direction, what was the life of the pre-cut chain and the shearer motor, and had any trouble been experienced with the trailing cables.

Replying, the AUTHORS said experience at Pye Hill had shown that a 2-ft. 3-in. shaft was the maximum length which could be used effectively if the stability of the machine was to be maintained. It was felt that the percentage of large coal could be increased more satisfactorily by reducing the thickness of the kerves. "XY" pick-boxes had been used in place of Dreadnought pick-boxes to give a thinner shear kerf and further developments were being pursued along those lines to reduce the thickness of coal taken out by the shear disc to as little as 2 in. to 3 in.

An attempt was also being made to reduce the thickness of the horizontal kerf by inserting the mushroom picks into the shaft and dispensing with the sleeves. Each trailing cable was in the charge of an operator and no abnormal troubles had been experienced with them. The pre-cut chain was changed monthly. The tension of the chain was critical if breakdowns were to be avoided.

The load on the lump shearer motor was less than that of the conventional drum shearer and overloading was prevented by magnamatic control. Maintenance and renewals were carried out regularly; hence it was impossible to estimate motor life.

MR. W. MORRELL asked what difficulties were experienced with the slide-bar system of support. He understood that packs were built with the slide-bar system, but now caving was done in association with Dowty Roofmasters. What was the saving in manpower due to the changeover?

The only difficulty with the slide-bar system of support, replied the AUTHORS, was the time taken by one man to advance a given number of supports. This was such that machine performance was reduced. Two solutions were available. Increased manpower would have improved machine performance, but it would also have increased wages cost and might have reduced productivity. Self-advancing supports would give improved machine performance, reduced manpower, and increased productivity.

The latter solution was, therefore, adopted resulting in a saving of 11 men per shift, or 110 manshifts per week. The highest productivity achieved with slide-bars was 157.5 cwt./manshift, but with self-advancing supports, productivity had reached 294.3 cwt. The average weekly saleable output since the installation of Roofmasters was just over 3,100 tons.

In reply to MR. J. A. WALKER, the AUTHORS stated that five cuts could be removed without the maximum distance of 21 ft. from rip pack to face being exceeded. By ripping on the night shift, this advance could only be accommodated if it occurred occasionally. Naturally, where this advance was realized regularly, the gate-side packs would have to be advanced at intervals of less than 24 hr.

MR. J. SMITH noted that of the total 116 min. machining cycle only 43 min. were spent in actual cutting time which was about 37 per cent. utilization of the machine. He asked if the authors could enlarge on this point and whether they had any comparison figures for conventional disc shearers.

Replying, the AUTHORS said that the specified conditions for the trials of this machine necessitated a pre-cutting machine and, therefore, involved more operations, with corresponding delays in a complete cycle. The remaining 73 min. involved flit-ploughing the full face length and work involved in preparing the machines for cutting and ploughing. The average figure of machine utilization for conventional shearers was about 65 per cent. actual cutting time of the whole cycle, but in this case only one machine was being used. Machine speeds and cutting times were determined by the slower machine and a delay to one machine automatically became a delay to the other.

Another important factor affecting machine utilization was the face length available for cutting. There were certain necessary operations involved in any one complete machine cycle, such as work done on the machines in the stable holes and the time for these operations might be accepted as being fairly constant. The total cutting time on a 100-yd. face would be about 50 per cent. of that on a 200-yd. face, as would the flitting time. The corresponding percentages of cutting time to machine cycle time would vary even with all other conditions and times remaining constant. The machines on 17's district were Magnamatic and therefore the possible cutting speeds were increased and the flitting speeds decreased compared with a conventional disc shearer. This again would reduce the proportion of cutting time to complete cycle time.

Replying to MR. G. A. PERCIVAL, the AUTHORS regretted that no figures were available showing the amount of coal loaded when ploughing and when shearing. The number and position of the kerves were such that the majority of the coal must be loaded when the machine was cutting. Apart from negligible quantities which the plough failed to gather, all the coal below the horizontal shaft must be loaded during shearing. The percentage of top coal loaded during this period depended on the presence of intermediate and roof breaks. In this particular case, most of the top coal fell from the face before the passage of the plough, hence the amount of coal loaded during ploughing was very small.

MR. T. JAMESON asked for more details of the results obtained by rotating the disc in the two directions and also what effect the line of cleavage had on the performance of the machine. Replying, the AUTHORS stated that experiments with disc rotation were carried out on the original lump shearer installation at 6's panel. Ammeter readings were taken at 1-min. intervals while the machine made a complete traverse of the face. The mean value for clockwise or "up and over" rotation was 61.5 A. and the mean value for anti-clockwise or "down and under" rotation was 46.6 A. The suggested reason for this large difference was that during "up and over" rotation, the picks in the horizontal shaft tended to push fallen blocks of coal forward. This would also increase the make of small coal, although no figures were available to substantiate this.

Experience had only been gained with this machine

working where the coal was "on end" and results had been encouraging. The danger with coal worked on "bord" was the production of large unmanageable blocks of coal. These might overhang the plough, tending to wedge it into the kerf formed by the shear disc. This could also occur where the face line formed an acute angle with the line of cleavage. There was the added danger of large slices of coal falling on to the conveyor between the two machines. At the moment, experience would indicate that the coal should either be "on end" or at least "half-bord."

Advancing Roof Supports

Replying to a question by MR. H. HORROCKS, the AUTHORS said the work load on the waste operators, was spread fairly evenly throughout the shift. As the machine was cutting, the two-leg face supports were advanced, and as the machine ploughed back the conveyor was snaked over to the face using the pushers which were located in every fifth support. Finally, the aft-supports were advanced. Although cleaning up the face side was only done after ploughing, this man completed his shift assisting other members of the face team. Time studies showed that four men were required to advance Roofmasters, clean up face-side, and snake the conveyor over.

Replying to questions from MR. H. RODDIS, the AUTHORS said difficulties were experienced in designing the plough, firstly because its function was unique and, secondly, because it was extremely difficult to represent the plough on working drawings. The plough was required to lift and turn the coal rapidly so as to keep the length of the plough to a minimum and to ensure that cutting speeds were not reduced due to additional load on the plough.

Top coal tended to fall on to the plough and did not present any difficulty, but the bottom coal presented a problem. Below the horizontal shaft there was a tendency for large blocks of coal to be formed in the path of the plough. In thin seams, however, the thickness of this section of the coal would be reduced, hence the size of the blocks produced would be less. Plough design was mainly governed by the shape and size of material which it is required to load, so that with thinner seams, plough design should become simpler.

The two different cutting speeds quoted were average speeds obtained from studies taken over the full 195 yd. of face. It was found on both studies that the machine was able to maintain an average speed of 14 ft./min. from the main-gate stable up to the fault and an average speed of 9.5 ft./min. from the fault to the left-hand stable. During February, 1959, the machine was cutting through 145 yd. at the higher speed and 50 yd. at the slower speed, while during July, when the fault had moved nearer the main gate, the machine was cutting through 60 yd. at the higher speed and 135 yd. at the slower speed. The explanations given were, firstly, that the nature of the coal was much harder from the fault to the left-hand stable and, secondly, that from the main gate to the fault, the coals were inclined to fall from the face and on to the conveyor after the machine had passed. Therefore, over this section of the face the machine was not ploughing the full 2 ft. 3 in. depth of coal on to the face conveyor.

MR. D. MARRIOTT asked if the stable-hole plan showed the position in the stable hole at the start of the morning shift, and if so what were the arrangements for advancing the stage loader. He also asked if there was any organization to ensure that the machines reached a stable hole at the end of the day.

Replying, the AUTHORS stated that the illustration did not represent the installation at any particular stage of production. The stage loader was not advanced during the production shifts, but to enable the face conveyor to be maintained in a straight line a small advance heading was won in front of the stage loader so that sufficient advance could be obtained in one movement. No organization was in being to ensure that the machines finished each day during the week in the stable holes. It was not considered necessary for this to be carried out other than at weekends.

MR. D. JOHNSON said that it had been stated that it would be advisable to have the disc rotating in a "down and under" direction where the coal did not part readily from the roof. He commented that on most conventional shearer faces where the machine took the full seam section, the drum rotated in an "up and over" direction and machine stability was not affected, and asked if the authors could enlarge on their statement.

Replying, the AUTHORS said that 2 ft. 3 in. was the maximum length of shaft which could be used to maintain machine stability. Any increase in length would tend to tilt the machine towards the face, as most of the weight of the cutting mechanism was situated at the outer end of the horizontal shaft. This shaft was some 7 in. longer than the conventional shearer drum shaft which had the weight of the drum distributed evenly along it. This meant that in a case where the coal did not part readily from the roof, the disc would be cutting upwards through practically the full seam section and the reaction to this cutting resistance would be to force the disc downwards into the floor. On the other hand, if the disc were rotating in a "down and under" direction, the weight of the machine itself would ensure stability.

Replying to MR. R. B. HAMBLETON, the AUTHORS said where top and bottom cutting members were provided with the lump shearer, they agreed that there was a similarity with the A.B. Meco-Moore. However, this was the only similarity and they preferred the lump shearer for the following reasons:—(*a*) It afforded continuous haulage; (*b*) conveyor mounting ensured more positive control; (*c*) although the machine only cut in one direction, it did not require turning in the stable hole; (*d*) the machine lent itself to mechanized support systems; (*e*) there were no metal-to-metal wearing parts in the back shearing disc; (*f*) relatively simple mechanical construction; (*g*) there were no moving parts in the loading unit; and (*h*) higher gross output and productivity was obtained.

In reply to a question by MR. A. SEVERN the AUTHORS said that to maintain the windings of any motor at or below the maximum permitted temperature, the heat equivalent of the electrical input must be dissipated at a given rate. In the majority of cases this could be achieved by air cooling, although on motors used underground, its effect was considerably reduced by the restrictions imposed for safety reasons on the design of motor enclosures. Under normal coal-face conditions effective air cooling could be achieved on power loaders fitted with motors of 60-80 h.p., provided they were not overloaded excessively.

With magnamatic control, the motor could not be overloaded, but it might be required to operate at full load for long periods. With 100- to 125-h.p. motors working under these conditions the electrical input, and therefore the heat equivalent, was increased. Air cooling alone was no longer satisfactory and, hence, water cooling must be used.

Forthcoming Events

NOVEMBER 21

Institution of Production Engineers (Sheffield Graduate Section):—Meeting at Samuel Fox & Company, Limited, Stocksbridge, near Sheffield, at 7 p.m. "Machine-tool Lubrication," by A. E. Annable.

NOVEMBER 22

Combustion Engineering Association (North Western Region):—Meeting at the Engineers' Club, Albert Square, Manchester, at 2.30 p.m. "Automatic Control of Coal-fired Plant," by H. B. Weston, deputy area engineer, NIFES.

Sheffield University Mining Society:—Meeting in the Mining Lecture Theatre, St. George's Square, Sheffield 1, at 5 p.m. "Fire Fighting and Rescue," by J. Blunt, divisional safety engineer of the North-Eastern Divisional Coal Board.

Institution of Chemical Engineers (North Western Branch):—Meeting at the Manchester College of Science and Technology, Jackson Street, Manchester 1, at 3.30 p.m. "New Developments in the Bulk Supply of Chemical Reagents."

South Staffordshire and Warwickshire Institute of Mining Engineers:—Meeting at the Swan Hotel, Lichfield, at 3 p.m. (council meeting at 2 p.m.). "Modern Practices in Staple Shaft Developments at Lea Hall Colliery," by J. W. Evans.

Institute of Marine Engineers:—Meeting at the Memorial Building, 76, Mark Lane, London, E.C.3, at 5.30 p.m. "The Automatic Control of Naval Boilers," by Cdr. J. P. H. Brown and Lt.-Cdr. W. J. R. Thomas.

Institution of Plant Engineers (South Wales Branch):—Meeting at 62, Kingsway, Swansea. "Electrical Regulations and Safety in Factories," by E. Sutton, HM Electrical Inspector of Factories.

Institution of Mechanical Engineers (Lubrication Group):—Meeting at 1, Birdcage Walk, Westminster, London, S.W.1, at 6 p.m. Discussion on "Bearing Corrosion."

Institution of Mechanical Engineers (Eastern Branch):—Meeting at the Dujon Restaurant, Bedford, at 7.30 p.m. "Developments in High-nickel Alloys for Heat and Corrosion Resistance," by J. Hinde.

Institution of Mechanical Engineers (Rugby Sub-Branch):—Meeting at Rugby College of Engineering Technology at 6.30 p.m. "The Future of Air-breathing Engines in Aviation," by S. G. Hooker.

NOVEMBER 23

Combustion Engineering Association (Midland Region):—Meeting at the Birmingham Exchange and Engineering Centre, Stephenson Place, Birmingham 2, at 10.30 a.m. "The Factories Acts in Relation to Boilers and Pressure Vessels," to be opened by H. Entwistle, HM Engineering Inspector of Factories.

North East Coast Institution of Engineers and Shipbuilders (Tees-side Branch):—Meeting at the Cleveland Scientific and Technical Institution, Corporation Road, Middlesbrough, at 6 p.m. "Some Notes on Shipyard Reorganization," by R. Ibison.

Institution of Plant Engineers (North East Branch):—Visit to Silksworth Colliery (Co. Durham).

Institution of Mechanical Engineers:—Meeting at 1, Birdcage Walk, Westminster, London, S.W.1, at 6 p.m. "Blaenau Ffestiniog and Other Medium-head Pumped Storage Schemes in Great Britain," by H. Headland.

NOVEMBER 24

Institution of Plant Engineers (Merseyside and North Wales Branch):—Meeting at the Blossoms Hotel, Chester, at 7.15 p.m. "Breakdowns—Another Year of Case Histories," by J. Sword.

Institution of Plant Engineers (Sheffield and District Branch):—Meeting at the Grand Hotel, Sheffield, at 7.30 p.m. "The Introduction of Planned Maintenance Systems," by A. F. Stedman.

Institution of Mechanical Engineers (North-Eastern Branch):—Meeting at Stephenson Building, Claremont Road, Newcastle-upon-Tyne, at 6.15 p.m. Informal discussion group meeting. "Relation Between the Critical Alternating Pronagation Stress and Crack Length for Mild Steel," by N. E. Frost.

Institution of Mechanical Engineers (North-Western Branch):—Meeting at the Engineers' Club, Albert Square, Manchester, at 6.45 p.m. "Selection and Training of Foremen," by H. Walker.

Institution of Marine Engineers (North East Coast Section):—Meeting at Stephenson Building, King's College, Claremont Road, Newcastle-upon-Tyne, at 6.15 p.m. "Marine Machinery Failures," by H. N. Pemberton.

Institution of Marine Engineers (Southern Joint Branch):—Meeting at Portsmouth Technical College at 7.30 p.m. "The Latest Techniques for Corrosion Prevention," by Dr. J. S. Hudson.

NOVEMBER 25

Institution of Production Engineers (Derby Section):—Meeting at the St. James Restaurant, St. James Street, Derby, at 7 p.m. "Developments in Dimensional Accuracy," by K. J. Hume.

NOVEMBER 26

Royal Institution of Chartered Surveyors:—Mining surveyors' general meeting at the Welbeck Hotel, Nottingham, at 10.30 a.m. "Offshore Mineral Exploration," by R. H. Garnett.

NOVEMBER 28

Institution of Production Engineers (Sheffield Section):—Meeting at the Grand Hotel, Sheffield, at 6.30 p.m. "Membership Qualifications," by H. W. Hodson.

Institution of Production Engineers (Manchester Section):—Meeting at Manchester College of Science and Technology at 7.15 p.m. "Machine-tool Development as Seen at Olympia, 1960," by N. Stubbs.

Institution of Plant Engineers (West and East Yorkshire Branch):—Meeting at the Houldsworth School of Applied Science Leeds University, at 7.30 p.m. "The Building of a Modern Oil Tanker," by W. S. Brown.

Institution of Mechanical Engineers (Yorkshire Branch):—Afternoon visit to Hepworth & Grandage, Limited, Bradford. Meeting at the Institute of Technology, Bradford, at 7.15 p.m. "Planned Maintenance," by W. Jones.

NOVEMBER 29-30

Iron and Steel Institute:—Autumn general meeting at Church House, Great Smith Street, London, S.W.1.

NOVEMBER 29-DECEMBER 2

Corrosion and Metal Finishing Exhibition:—At the Empire Hall, Olympia, London.

National Association of Colliery Managers

NOVEMBER 23

Lancashire Branch:—Meeting in the Lecture Room, Manchester Literary and Philosophical Society, George Street. R. H. Clough, HM Divisional Inspector of Mines, will introduce his report on the North Western Division for 1959.

NOVEMBER 25

Kent Branch:—Meeting at the Swan Hotel, Deal, at 7.15 p.m. "The Coal Plough."

NOVEMBER 28

Midland Branch:—Meeting at the Denman's Head Hotel, Sutton-in-Ashfield, at 6.30 p.m. Paper by G. A. Percival, ventilation engineer, No. 4 Area, East Midlands Divisional Coal Board.

NOVEMBER 29

South Wales Branch:—Meeting at the Welsh College of Advanced Technology, Cardiff, at 6 p.m. "Some Problems of Mechanization in the South-Western Division," by G. V. Standerline, mechanization engineer, South-Western Divisional Coal Board.

Bradford Course on Causes and Prevention of Failures

COURSE of six weekly lectures will be held at the Institute of Technology, Bradford, on Wednesday evenings at 7 o'clock, commencing on January 18. The course will commence with a general lecture on types of failure. Fatigue will be dealt with subsequently in detail.

Other lectures in the course will emphasize the types of failure which predominate in various branches of engineering.

Application forms, giving full details, may be obtained from the Registrar, Institute of Technology, Bradford (Yorks).

BISRA STEELMAKING CONFERENCE

The Practical Chemistry of OXYGEN STEELMAKING PROCESSES

By R. A. HACKING
(Richard Thomas & Baldwins, Limited)

This was the opening paper at the 55th BISRA Steelmaking Conference, held at Harrogate on October 12 and 13, reported upon in our October 21 issue (p. 901). Before presenting his paper the author spoke of the aptness of the opening remarks of Dr. T. P. Colclough, technical adviser of the British Iron and Steel Federation, who opened the conference, and of his kindly reference to the late Oscar Brandt, whose untimely death had robbed the steel industry of a farseeing and enthusiastic protagonist of oxygen steelmaking.

PURPOSE of this initial talk is to give a general account of some of the new steelmaking techniques which have resulted from tonnage oxygen and to describe their essential features and points of difference as a background for the succeeding paper of the conference by Dr. Pearson, which will be concerned more closely with the chemical principles involved in the modified and new oxygen steelmaking processes.

Steelmaking processes can be classified in two main groups:—(*a*) Those requiring external fuel for melting and refining, *e.g.*, OH and electric melting; (*b*) those requiring no external fuel, *e.g.*, the "Pneumatic Processes."

Tonnage oxygen has led to marked improvements in all processes, but the effects in the "Pneumatic Processes" are perhaps most spectacular and may in time change the entire pattern of bulk steel production.

The Basic-Bessemer (or Thomas) Process

As you will all be aware, steel is made in the basic-Bessemer process by bottom-blowing air via tuyeres through a charge of molten iron in a basic-lined converter. Lime is added to form a slag and the impure iron is refined, *i.e.*, carbon, silicon, sulphur, and phosphorus are removed. Finishing additions are made to yield the final steel. The entire operation takes from 15 to 18 min. for 18- to 30-ton charges.

Fig. 1 shows the composition changes in a typical basic-Bessemer heat. Silicon and manganese are eliminated in the early stages, followed by carbon and, finally, by phosphorus. Indeed, at the virtual completion of carbon elimination, substantial amounts of phosphorus remain, which are subsequently reduced to practical levels in a critical phase, known as the "after-blow." This lagging of phosphorus removal behind carbon

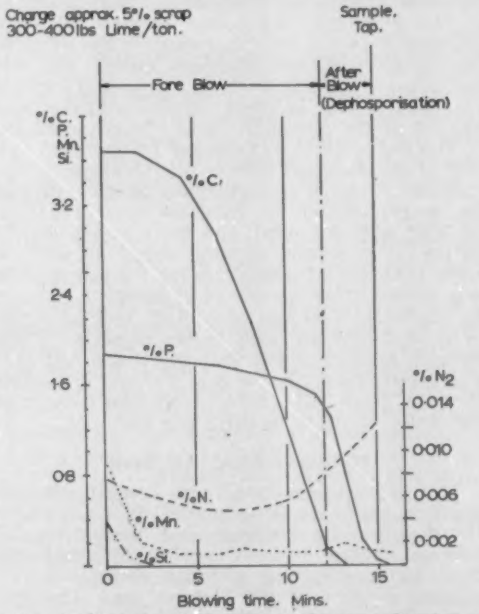


FIG. 1.—TYPICAL COMPOSITION CHANGES DURING A CONVENTIONAL BASIC-BESSEMER HEAT.

removal, and the marked absorption of nitrogen which occurs in the "after-blow," are the two significant features revealed by Fig. 1. The reasons for these are now well appreciated, and Dr. Pearson will doubtless refer to them in the next paper of the conference.

The basic-Bessemer process and the resulting product, though admirable for many purposes, have certain limitations and disadvantages. Since the heat required for the process comes from exothermic reactions in the bath, and since the slag requirements and ease of furnace operations are controlled by the silicon and phosphorus contents of the iron, the range of irons for successful blowing is limited. Thus silicon content usually lies between 0.3 and 0.7 per cent. and phosphorus between 1.5 and 2.3 per cent.

The thermal balance of the process limits the scrap melting capacity to about 7 per cent. and thus the process cannot consume its own scrap arising. The chemistry of the process, that is, the carbon and phosphorus relationship, limits the product to those steels that can be made by recarburization of a fully blown highly oxidized bath. The high nitrogen of the product, 0.010 to 0.020 per cent., the generally higher phosphorus content compared with similar open-hearth qualities, and the consequent hardening properties place severe restrictions on the applicability of Bessemer steel, although there are, of course, certain service conditions where Bessemer steels show to advantage.

In spite of these limitations and restrictions, the Bessemer process has remained in many countries as an economic steelmaking method relatively unchanged since its inception. Nevertheless, increasingly rigid specifications during the war and post-war years necessitated measures to improve the quality; this, in effect, implies reduction and control of the phosphorus and nitrogen contents.

The first problem was attacked by improved control of the slags and even by double-slagging procedures. Nitrogen absorption was found to depend on temperature of the bath, the time of contact of blast with the metal, and the nitrogen content of the gas in contact with the metal. In practice, some reduction of nitrogen in the finished product was achieved by the use of shallower baths and by controlled additions of coolant, such as scrap, or coolant-oxidants, such as ore or scale. Thus, by such methods, HPN steel which was first produced in Germany in the later war and immediate post-war years had a reduced nitrogen content of the order of 0.008 to 0.012 per cent.

Oxygen-enriched Air Blast

This improvement in nitrogen content was still insufficient to make Bessemer steel fully acceptable for deep-drawing purposes, but the advent of tonnage oxygen made it possible to attack the third factor governing nitrogen absorption, *i.e.*, nitrogen content of the blowing gas. The first approach was to enrich the air blast to an oxygen content of the order of 30 to 35 per cent., which, while not altering fundamentally the chemistry of the process, shortened the blow, increased production rates, and relieved to some extent the thermal restrictions, *i.e.*, permitted the use of lower silicon irons, increased scrap and/or oxide.

While these effects cumulatively had a beneficial effect on the final nitrogen content, *e.g.*, 0.005 to 0.008 per cent., the critical phase for nitrogen pick-up, *i.e.*, the "after-blow" in which the gas in contact with the metal is substantially 100 per cent. nitrogen, still remained. It became obvious that real significant improvement in final nitrogen content would not be achieved until nitrogen could be eliminated from the blast.

Bottom blowing with substantially pure oxygen was impracticable for several reasons, *e.g.*, refractory wear, violence and speed of reaction, and overall thermal balance. Substitution of the nitrogen in the blowing gas by "endothermically" dissociating gases which would have a cooling effect (and thus restore the thermal balance to practical limits) and at the same time would be oxidizing, was then investigated. Accordingly, oxygen-carbon dioxide mixtures were developed for bottom blowing in Belgium, where they are still used in regular production in at least one large plant. Steam admixture with oxygen was also investigated on account of its cheapness, availability, and known coolant effect, and 60 to 40 (by weight) oxygen-steam mixtures for improved bottom-blown Bessemer steel, have now achieved general acceptance.

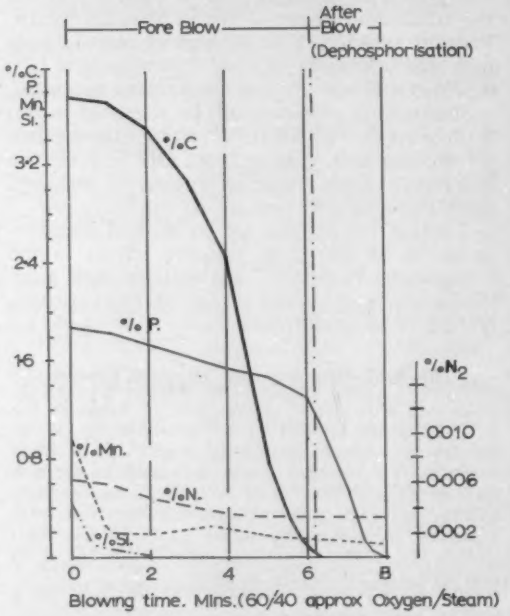


FIG. 2.—TYPICAL COMPOSITION CHANGES DURING A BOTTOM-BLOWN OXYGEN-STEAM HEAT.

Oxygen-steam Blast

Fig. 2 illustrates the course of a typical bottom-blown oxygen-steam heat. The main effects revealed are a shortening in the total blowing time and absence of nitrogen absorption in the later stages of blowing such that the final nitrogen content is similar to and, in many instances, somewhat below that for the average open-hearth heat.

The final hydrogen content, not shown in Fig. 2, resulting from a full-blow with oxygen and steam, is usually higher than for comparable open-hearth steel, but this is not serious in the steels for which this process has been mainly applied, *i.e.*, unkilled steels, and subsequent fabrication operations to thin gauges give ample opportunity for the diffusion of the hydrogen without harmful residual effects on the final product.

The use of oxygen-steam mixtures, however, necessitates certain changes from conventional Bessemer practice. Thus, the blast has to be pre-heated, usually to about 200 deg. C., to avoid condensation in the mains and windbox and to avoid hydration of the dolomite bottom. In fact, severe damage to the dolomite bottom has been one of the most serious problems in the development of this method. It has, however, been reduced to manageable proportions by careful attention to bottom-making and design and by the use of copper-lined tuyeres. Another interesting difference is that fume formation is considerably reduced compared with conventional practice and with oxygen-enriched air-blast practice.

Usually, bottom-blowing converter plants using oxygen-steam mixtures are equipped also for oxygen-enriched air blast and, of course, conventional air blowing. This permits flexibility of operation, and the various processes are used according to the steel qualities involved, and the hot metal composition and scrap availability. Moreover, since nitrogen absorption only becomes significant in the later stages of blowing, mixed blowing is now practised in many plants to minimize the damage to the bottom. Thus, an oxygen-enriched air blast is used for the earlier stages of blowing and an oxygen-steam mixture for the final stages.

Incidentally, where low-phosphorus contents are required, a double slag technique is often employed. The first main slag is removed at the normal end of the process, a small amount of the soda slag is added and the blow continued, often with enriched air, for a short period, *i.e.*, 15-45 sec. The soda slag is thickened and retained in the vessel for the next blow in order to reduce iron losses. Furthermore, the above double-slag practice has a significant effect on the hydrogen content which it reduces from the high level given by the normal oxygen-steam blowing practice.

Oxygen-carbon Dioxide Blast

The extreme flexibility provided by these modified bottom-blowing practices is perhaps best demonstrated at the Belgian plant, which has developed the O_2-CO_2 mixture. This plant is equipped, in fact, for blowing mixtures of air, oxygen, carbon dioxide, and steam, and can vary the blast mixture at will. Thus, for sheet qualities, steam mixtures would be used, and for killed steels in thicker sections, carbon dioxide mixtures.

There have, of course, been many other developments in connection with these improved bottom-blowing practices. The speeding up of the refining reactions and the improvements in steel qualities thus produced have necessitated instrumental aids to control final condition and temperature and to record and control operating factors, such as gas flows and pressures. Converter design has been studied and the effects of injecting solid materials with the blast air are being examined, with particular reference to the fundamental feature of these bottom-blowing procedures, *i.e.*, the delay in removal of phosphorus.

It is known that lower temperatures and fluid oxidizing basic slags favour the removal of phosphorus from iron melts and it is possible that the early production of active slags, by the injection of powdered oxides and fluxes, may accelerate the phosphorus removal and thus eliminate or substantially reduce the need for an "after-blow" with its attendant disadvantages.

There may be important rewards to be gained from continued research on bottom-blowing practices.

Top Blowing with Oxygen

The success achieved by bottom blowing with high oxygen blast mixtures, the difficulties with refractories under such conditions, and the rather special circumstances facing the Austrian steel industry in the post-war years, have doubtless each contributed to an oxygen steelmaking development which promises to revolutionize basic steelmaking throughout the world, *i.e.*, top blowing with pure oxygen. The possibilities of top blowing with oxygen-rich mixtures had been indicated by the acid-lined Tropenas process developed in this country, and by the "Turbo hearth" in the USA.

The LD Process.—The Austrian iron and steel industry is based on famous Erzberg deposits in Styria, which yield an iron characteristically high in manganese (approx. 2.5 per cent.) and low in phosphorus (approx. 0.10 per cent.) ideal for open-hearth use, but with a phosphorus content too high for the acid Bessemer, and much too low for the basic-Bessemer processes. Scrap availability and economic considerations precluded open-hearth steelmaking, and following pilot experiments in 3 to 15 ton capacity vessels, the LD process was developed. It is confidently expected that in the very near future, the world production of steel by the LD process, including its modifications to deal with higher phosphorus irons, will exceed 20,000,000 tons annually.

The general course of an LD heat on typical Austrian iron is shown in Fig. 3 (the P is somewhat below typical: the very low Si is characteristic of Donawitz), which shows how phosphorus

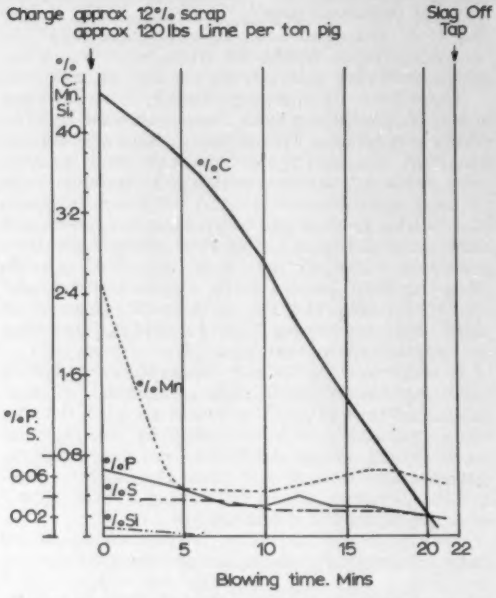


FIG. 3.—TYPICAL COMPOSITION CHANGES DURING AN LD HEAT.

and carbon are eliminated simultaneously such that at the completion of carbon removal, phosphorus is low (0.015 per cent.) and no "after-blow" is required. An important consequence of this is the possibility of "catch-carbon" heats with a resultant chemistry more akin to open-hearth practice than to Bessemer practice.

Sulphur removal is excellent; in fact, final sulphurs are often better than are obtained in conventional open-hearth practice. Nitrogen absorption is prevented by the vigorous evolution of carbon monoxide and by the stream of oxygen over the surface of the bath, and an interesting feature is the reversion of manganese towards the end of blowing which helps to control the final bath condition. As would be expected, hydrogen contents are very low.

The original production vessels were in effect, solid-bottom Bessemer shaped converters of about 35 tons capacity, lined with tar-dolomite bricks at Linz and magnesite brick at Donawitz. Oxygen is admitted via a vertical water-cooled burner such that the nozzle is about 4 ft. above the metal surface, the charge being hot metal and scrap or iron ore. Lime is added once the bath is "ignited" and the flame continues until the carbon drops. Blowing time for 35 tons is about 18-20 min., and tap-to-tap time about 35 min.

For the larger converters of over 80 tons which have since been operated at Aliquippa, blowing times for 83.5 tons have averaged 21 min., and tap-to-tap times 46 min. Oxygen consumption is slightly greater than the theoretical amount required for the oxidation of the metalloids.

The use of 100 per cent. oxygen gives a very favourable thermal balance, and depending on the hot metal composition, scrap consumption may exceed 30 per cent. particularly with the high-phosphorus irons.

The fume problem is formidable, as is the resulting iron loss, but several satisfactory methods, both wet and dry, have been developed for dealing with the fume. In one method, the evolved gases plus entrained air are passed through a waste-heat boiler and the cooled gas cleaned by electrostatic precipitator; the recovered oxide dust improves the iron yield of the process by 0.6 per cent.

As already stated, the process has been widely taken up, throughout the world; crucible sizes have increased and, as you well know, vessels of over 100 tons capacity, will shortly be installed at the new integrated works at Newport. In the USA, two current development schemes incorporate LD vessels of 160 and 250 short tons capacity.

The success achieved by top blowing with oxygen under the special conditions in Austria, *i.e.*, high-manganese, low-phosphorus iron, immediately stimulated research in various countries to extend this principle to the higher phosphorus irons, including the conventional 1.5 to 2.0 per cent. phosphorus basic-Bessemer irons.

The acceleration of phosphorus removal from such irons, thereby approaching OH practice chemistry, would be a technical advance of the highest significance. Work on these lines on 3-ton and 25-ton converters at Mannesmann, reported at the Liége Conference in 1953, came close to achieving success. It was shown that by regulated additions of lime and ore to promote early slag formation and to control the temperature, satisfactory acceleration of phosphorus removal should be achieved.

A practical solution of the problem has now been obtained by injection of powdered lime in the gas stream using procedures developed simul-

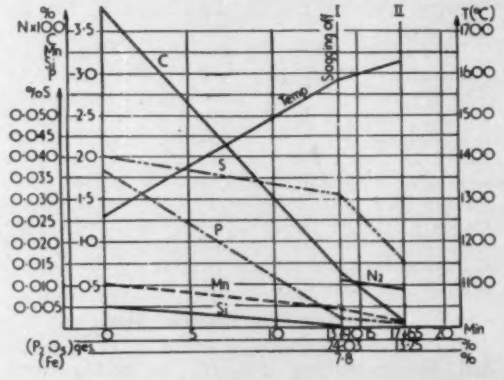


FIG. 4.—TYPICAL COMPOSITION CHANGES DURING AN LD-AC HEAT.

TABLE 1.—*Typical Catch-carbon Blow by LD/AC Process.*

Oxygen blow.		Remarks.	Metal.		Slag.			
Min.	Sec.		C.	P.	SiO_2	Fe.	P_2O_5.	CaO.
		Iron analysis	2.96	1.20				
14.	0	Primary slag off	1.04	0.130	8.0	8.2	20.6	57.5
17	0	Secondary slag off	0.69	0.069	7.2	13.9	16.9	56.0
18	30		0.59	0.040	5.0	25.7	11.1	52.5
19	30		0.48	0.033	4.4	30.7	9.6	48.5
20	30	Finishing slag	0.41	0.027	3.6	32.7	8.6	46.5
			C.	P.	Mn.	S.	Si.	N_2.
		Pit analysis	0.488	0.035	0.90	0.023	0.15	0.005

taneously in Luxembourg and Belgium, and the modified process, known as the LD/AC process has become the accepted method of LD steelmaking for high-phosphorus irons. Two or more slags are required, depending on the phosphorus and carbon specifications, the final slag being retained in the vessel for the following blow. Parallel developments have been carried to a successful conclusion by IRSID in France. Data from a typical LD/AC blow in a 30-ton vessel is shown in Fig. 4.

The operation of an LD/AC blow is briefly as follows. The vessel is charged with 23 tons of hot metal (1.69 per cent. P), 4 cwt. of iron ore sinter, 4 cwt. of bauxite, and 1 ton of pebble sized lime, followed by 5 tons of heavy scrap. The oxygen lance is lowered to about 6 ft. from the bath and oxygen blowing is continued for 5 min., following which lime injection (at 250 lb./min.) is commenced, the lance being progressively lowered to 4 ft. during the subsequent blowing. A total radiation pyrometer sighted on the flame gives a good indication of lance height and degree of foaming.

After 14 minutes' blowing, the primary slag is removed (8 per cent. Fe and 15-20 per cent. P_2O_5), while the metal averages 0.6/0.7 per cent. C and 0.1-0.15 per cent. P. About 1 ton of light scrap is added, and blowing and lime injection started again for a further 3 to 5 min. Depending on the final phosphorus requirements, a further slag may be made and the vessel tapped through a lime bridge. Some vessels are fitted with a taphole in the side in order to facilitate the tapping of the steel while retaining the final slag for the succeeding blow.

The operators of the LD/AC process lay great importance on the production of a controlled foaming action. The degree of foaming is controlled by the silicon content of the iron, by the height of the lance above the liquid bath, and by additions of raw limestone chippings. This foaming or blanketing action may well be beneficial in improving oxygen efficiency and preventing nitrogen absorption.

Whether a single or double slag LD process is acceptable depends on the phosphorus content of the iron and the finished steel phophorus specification. In Japan using a 0.3-0.4 per cent. iron, either modification is used according to the phosphorus specification, and there is little reason to doubt that owing to its extreme flexibility in respect to raw materials, the process will be increasingly used for quality steels.

As one would expect from the charactistic curves already shown, the LD process lends itself readily to catch-carbon practice, especially when the starting point is medium-low-phosphorus iron. Thus, almost from the inception of the LD process at Alpine-Montan in Austria, and Bochumer-Verein and Witten in Germany, the following carbon and alloy grades have been regularly produced:—Steels for rails, band-saws, ballbearings (carbon-chrome), crankshafts (chrome-molybdenum), springs (silico-manganese), crusher jaws (Hadfield 14 per cent. manganese), etc. Catch-carbon practice from high-phosphorus irons is a more recent, but an equally successful development, as emphasized by the data in Table 1.

The simplicity and speed of refining with pure oxygen have stimulated other approaches to the top-blowing principle. Thus, it can be argued that the LD vessel, which stems from the conventional Bessemer converter is not an ideal vessel for top blowing, and that thermal and chemical efficiency might result by using a substantially closed and rotating vessel.

Prof. Kalling in Sweden has developed a top-blowing process which utilizes a cylindrically shaped vessel, rotating in an inclined position (20 deg.) at speeds up to 30 r.p.m., one end is closed and the other open to admit an oxygen lance, the waste gases passing back round the lance and into a water-cooled hood (Fig. 5). The vessel is capable of being tilted for charging, tapping, etc. The original vessels were of 3 tons capacity and the first commercial ones in 1956 of 30 tons; vessels of 100 tons capacity are now under construction, and, in fact, the Sollac unit of this capacity started operation recently, and has worked successfully with heats of over 120 tons.

The main aim of this process was the refining of high-phosphorus Bessemer iron to low-phosphorus and nitrogen steel, and the features which distinguish it from the LD refining method are:—(*a*) The rotation which permits steelmaking by fast slag-metal reactions. The manner of the mixing of slag and metal during rotation is not fully appreciated, but experience shows clearly that the speed of rota-

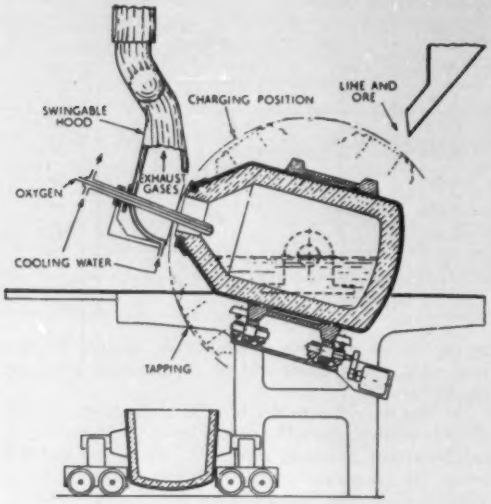


FIG. 5.—KALDO VESSEL IN THE BLOWING POSITION.

tion has a marked effect on the speed of refining; (*b*) The semi-closed container which, in conjunction with adequate oxygen supply, results in combustion of carbon monoxide to carbon dioxide with considerable thermal advantage to the process. In the Swedish practice over 30 per cent. of scrap can be consumed; in fact, recent practice claims 40 per cent. scrap consumption. (*c*) The oxygen pressure is lower (*i.e.*, about 45 lb./sq. in.), which quietens the reactions and helps to reduce iron losses to the exhaust gases.

The course of a typical heat, as illustrated in Fig. 6, closely follows that of the LD/AC process, although the process time, as would be expected of a slag-metal reaction process is almost doubled. Decarburization and dephosphorization occur simultaneously, although these effects can be influenced relatively by speed of rotation, and at the first slag off after 25 to 30 minutes' blowing, the bath contains about 1.5 per cent. C and 0.15 to 0.2 per cent. P.

One or more further slags may be necessary, according to the phosphorus required. As with the LD process, the process is adaptable to both low- and medium-phosphorus irons, and it is claimed that 0.3 per cent. phosphorus irons can be refined to 0.015 per cent. P steel using one slag. The fume problem is less severe than in the LD process and the cleaning process simpler. The refractory lining life, as might be expected, is less than that of the stationary LD vessel, but "time at temperature" is probably the main governing factor.

Chemistry-wise, the Kaldo process is a slower version of the LD process. This is perhaps understandable since the process approaches more closely to OH slag-metal refining practice than does the LD process. Under certain conditions, *e.g.*, catch carbon practice, this could be an advantage in providing a greater margin of control, but despite this, the Kaldo process has not been so widely adopted as the LD process. The added engineering complications of the rotating and tilting mechanisms have no doubt contributed to the present situation. A Kaldo plant will shortly be installed at Consett.

A further type of rotary furnace for oxygen steelmaking called the Rotor has been developed at Oberhausen. In effect, this is a combined top and immersion blowing process, as illustrated in Fig. 7. The larger Rotor at Oberhausen is a horizontal, cylindrical vessel, 13 ft. dia. by 48 ft. long, lined with tar-dolomite, which rotates slowly at speeds up to 2 r.p.m. Openings are provided at each end, for charging and the introduction of water-cooled lances at one end, and for the removal of waste gases and for tapping at the other end.

The Rotor can also be tilted in order to facilitate charging and tapping. Two water-cooled oxygen lances are used, mounted on a movable stand. One lance injects oxygen below the metal surface (*i.e.*, "primary" oxygen 99 per cent.) while the

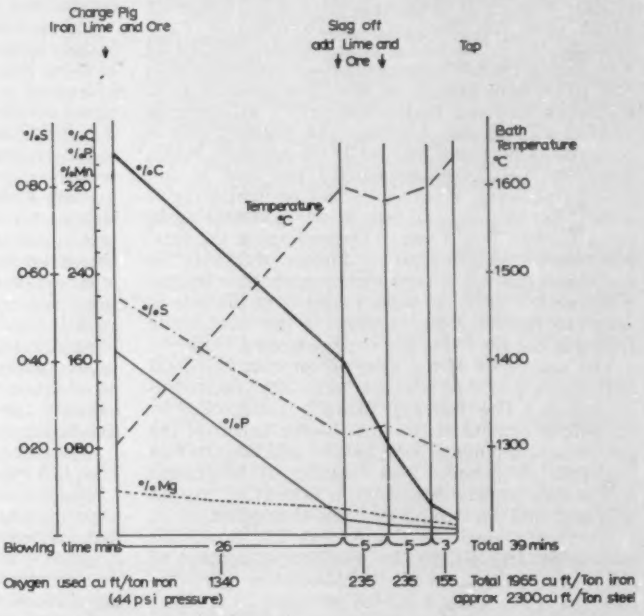


FIG. 6.—TYPICAL COMPOSITION CHANGES DURING A KALDO HEAT.

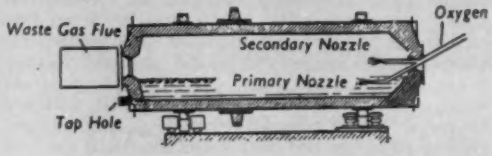


FIG. 7.—SCHEMATIC DIAGRAM OF THE ROTOR VESSEL.

other discharges its oxygen above the surface (*i.e.*, "secondary" oxygen 73 per cent. or even enriched air). The primary oxygen refines and agitates the metal, while the second provides for extra heat by combustion of carbon monoxide to dioxide. The waste gases pass out at the other end to a hood and cleaning system.

Originally, the Rotor was designed for pre-refining blast furnace iron, but experience has shown that medium- and high-carbon irons can be refined to steel in similar manner to the Kaldo process, with respect to oxygen usage, production rate, and ore and scrap consumption. The first 66-ton Rotor at Oberhausen produces steel with a tap-to-tap cycle of approximately 2 hr.

Rotors of 100 tons capacity have been installed in Germany and South Africa and recent information of the latter is that they have gone into production successfully with little difficulty. A Rotor plant is now being installed at Redbourn, essentially for the original purpose of pre-refining.

The chemical changes in the Rotor process are similar to those in the Kaldo process, although the actual mechanism of the refining is somewhat obscure. It would appear that the primary oxygen and resulting gas evolution cause metal to break through the slag cover, thus permitting further oxidation by the secondary air. More oxidation occurs than is accountable by the primary oxygen and the composition of the exit gases is a strong indication of the conditions inside the rotor. Control of the process is based on the oxygen flow rates, which can be varied independently, and on the volume and composition of the exit gas.

Combined Blowing Processes

Despite the remarkable change in the future pattern of steelmaking that the LD, Kaldo, and Rotor processes seem likely to produce, it is contended in certain quarters that these may not be the ultimate developments in oxygen steelmaking.

Top blowing with oxygen has the particular merit that under specified circumstances rapid slag formation can be achieved, and consequently produce rapid refining of the metal by slag metal reactions. The speed of refining is also accelerated by agitation of slag and metal and, while some turbulence is obtained in the above processes by oxygen jetting, by the use of rotating vessels and by immersed oxygen lances, bottom blowing is undoubtedly an excellent means of mixing slag and metal. Thus, simultaneous or consecutive top blowing with oxygen and bottom blowing with air or other gas mixtures, in correct proportions, might be held to be yet another step in the development of oxygen steelmaking.

Preliminary work in small vessels on such lines has been reported by German workers at Dortmund and a combined blowing process of this type has been developed by Phoenix Rheinrohr at Duisburg for 70-ton converters. In this latter process, known as the Phoenix Lance, or PL process, high-phosphorus iron is bottom blown, normally down to 0.1-0.4 per cent. carbon, the vessel is turned on its side for top blowing with an oxygen lance which eliminates phosphorus with little change of carbon, and the process is completed by a short bottom blow, to yield a low-carbon low-nitrogen product.

This is claimed to justify the belief that oxygen steelmaking may not yet have reached its ultimate form.

The author's own view is that the cardinal principles of oxygen steelmaking should be simplicity of plant and practice and speed of operation. Undue elaboration of plant and prolongation of "time at temperature" are to be avoided at all costs.

Other people evidently are of the same opinion, since the LD which, of all the steelmaking plant and techniques extant, has the fewest things which can go wrong, is outstanding among the new processes in the world-wide progress it has made in the first 10 years of its existence. At this moment of time, operating capacity aggregates 11,800,000 tons annually, while plant projected and being installed totals 22,300,000 tons annually—a grand total of over 34,000,000 ingot tons per year.

In concluding this very brief reference to the future of oxygen steelmaking, it is perhaps fitting to mention that the possibilities of combined top and bottom blowing were discussed some 10 years ago by the late Oscar Brandt, who was, as we all know, such an ardent supporter of oxygen steelmaking.

Open-hearth Processes

This brief review of oxygen steelmaking is perhaps not complete without some reference to the open-hearth process. Tonnage oxygen is now being applied generally to open-hearth furnaces with considerable benefits, and although the processes which have been developed would not be classified strictly as oxygen steelmaking, the distinction is becoming less evident. Oxygen is being used in open-hearth furnaces in one or more of the following ways:—(*a*) As an aid to combustion of the fuel by enrichment of the air, enabling more fuel to be burned with increased thermal efficiency during the charging and melting periods, and hence leading to quickened melting and refining; (*b*) for rapid refining usually by injection through lances either directly on to or into the bath; (*c*) for pre-refining the hot metal, thereby reducing the metallurgical load and hence the chemical work to be done inside the furnace during refining.

All these uses of gaseous oxygen lead to highly

significant increases in furnace output and fuel saving, while still retaining the essential features of open-hearth operation. During recent years, however, practices have been developed in several open-hearth plants which involve the extensive use of oxygen. The resulting practices deviate considerably from generally accepted open-hearth steelmaking and aproach the output rates and principles of pneumatic steelmaking.

Thus, at Appleby-Frodingham, large tilting furnaces have been modified, such that they are no longer true open-hearth furnaces, to operate the Ajax process. During the charging and scrap softening process, oxygen enrichment is used for combustion purposes, and after addition of hot metal, the combustion fuel and oxygen are cut off and refining continued by oxygen jetting. Normal firing is resumed shortly before tapping. Using a suitably modified furnace, the above process has given increased output rates of the order of 130 per cent., with fuel and oxygen costs approximately half that of the normal fuel. Similar results have also been obtained at Cornigliano.

Outputs of the order of 100 ton/hr. from 200-ton furnaces have recently been obtained by the Ford Motor Company from 50 per cent. scrap/5 per cent. hot metal charges. The furnaces are fitted with end burners for oil firing with enriched air and with roof lances for natural gas and oxygen. During charging the cold materials, both the end burners and roof lances are used in order to obtain rapid scrap melting. After addition of hot metal, the natural gas is cut off the roof lances, the end firing is gradually reduced, and refining continued solely by oxygen injection via the roof lances. After flush-slagging the end firing is discontinued entirely.

If the forgoing examples are indicative of future trends in open-hearth steelmaking with high hot metal charges, it is evident that the open-hearth process, as we now know it, may gradually evolve into an oxygen steelmaking process in a relatively shallow hearth with auxiliary firing to facilitate scrap melting.

£750,000 Char Industry for Western Australia

FORMATION of a company to explore and develop the mineral resources of Western Australia and Northern Territory is announced by the Griffin Coal Mining Company, Limited, and its finance and marketing associate, Heine Bros. (Australasia) Pty., Limited, Melbourne. Activities will be mainly in the south-west of Western Australia. The new company, called Mineral Mining & Exports (W.A.) Pty., Limited, has been established by the two contributing companies with a nominal capital of £500,000, and largely because of new developments in the manufacture of sponge iron.

Last May, the Griffin Coal Mining Company was granted an area of 320 sq. miles, south-east of Busselton, as a mineral reserve for coal, iron, bauxite, and sulphur ores. In July, the company was granted an additional reserve of 3,500 sq. miles adjoining the first reserve east and south of Busselton, with the same object.

The two companies in the new enterprise have plans for immediate construction of a plant on the Collie coalfied to produce 60,000 tons of char and metallurgical coke annually. Estimated cost of the plant, to be erected at the Muja open-cut owned by the Griffin company, is £750,000. The plant will be in operation in about 18 months.

A pilot plant established at Welshpool by the Western Australia Government has shown that char can be produced from carbonized high-grade Collie coals, which have a low ash content. Following satisfactory tests of a sample parcel produced at the Welshpool pilot plant, Japanese interests are in the market for char to provide the carbon for production of calcium carbide, used to make acetylene. A firm order has been received for early shipment of 40,000 tons of char.

The Western Australia Government plans to assist the company to supply present demand pending completion of the main plant. A special freight rate has been approved for transport of coal for carbonization at the East Perth gasworks. Dr. S. Uusna has been made available as a consultant to assist on the design of the char plant.

Mineral Mining & Exports (W.A.) Pty. is also investigating, with oversea associates, the possibility of establishing a sponge iron industry, near Collie. Two directors of the company plan to leave for oversea later this year to investigate processes already developed.

AUSTRALIAN EMBARGO ON EXPORTS OF IRON ORE

IT is expected that the Australian Government will favourably consider relaxation of the embargo on the export of iron ore. The embargo was based on official assessment that the total known reserves of iron ore in Australia were not sufficient to justify any exports.

A new assessment of the known deposits has indicated that reserves are sufficient for the demands of a century.

Pipeline Industries Guild

First lecture of the 1960-61 session of the Pipeline Industries Guild was held at Caxton Hall, London, S.W.1, on October 11. It was given by Mr. E. A. O. Mange, a director and general manager of Stewarts and Lloyds Plastics, Limited, on the subject of "Plastic Pipes and Pipe Joints." The lecture was followed by a lively discussion of members' experiences of this type of pipe.

TRAINING FOR THE MINING INDUSTRY

Presidential Address to Yorkshire Managers

By R. A. MACDONALD

Problems of training the mine managers and technicians of the future were reviewed by Mr. R. A. Macdonald in his presidential address to the Yorkshire Branch of the National Association of Colliery Managers on October 11, 1960. He suggests the establishment of an overman's certificate and expresses the opinion that the mining student spends too much time in the examination room. Extracts from Mr. Macdonald's address are given below.

IN 1959, 1,836 candidates sat the examination for the Ordinary National Certificate. This figure includes 378 mining surveyors, 338 mining mechanics, and 432 mining electricians. The number of successful candidates represented 59 per cent. of the total. In the same year, there were 377 candidates for the Higher National Certificate in mining, of whom 70 per cent. passed, and 219 candidates for the Higher National Certificate in mining surveying, of whom 67 per cent. were successful. For the National Diploma, 167 candidates entered and 78 per cent. passed. These figures do not take into account the work done with mine entrants; in training shotfirers, deputies, and Class 2 mechanics and electricians; or in preparing candidates for the six paper examination—which will probably end in 1961—and for higher professional qualifications, particularly in surveying.

A most desirable trend educationally is the increase in part-time day release. In 1938 there were 41,560 students who were granted day release, in 1957 there were 414,160, and a Government White Paper on technical education, published during February, 1956, set a target of 710,000 by early 1960. It must be conceded then that part-time day release will continue in accordance with Government policy.

Fewer Grammar School Students

The policy of the National Coal Board must be to attract the best type of student. At present, the mining departments of colleges get many students from the "B" and "C" streams of the modern secondary schools and a few from grammar schools. Since the fall in the demand for coal, with consequent economy measures, the few from grammar schools has tended to become even less. Unless the conditions of training in the mining industry keep in line with, or ahead of, those in other industries, there will be a further reduction in the number from grammar schools and they will not be in the top grade. Even now students are asking if it is worth while continuing in mining.

Many years ago, before pits were mechanized to the extent they are today, a manager remarked that great efforts were made in trying to reduce costs by a halfpenny per ton and yet a deputy could lose in a shift £2,000 to £3,000. If then, in a session, a college turns out one or two deputies who are tactful, can use a bit of commonsense, can lead the men and get things done without any fuss, can spot trouble in the offing and take care of it before it comes to a head, is it giving value for money? If in a decade a college turns out a first-class mining engineer, what is the return received by the industry during the working life of such an engineer? Who can say in terms of hard cash? Is this value for money?

What, then, is this yardstick with which to measure value for money in education or training? I submit that there is none, except, perhaps, a negative one in that a great industry just cannot afford, in view of growing competition in production and costs, at home and abroad, not to lead in education and training.

Recently much has been said about wastage. It would appear that all those students who entered a course, but did not, for some reason or other, complete it and who have not obtained a certificate to show for it are, for statistical purposes, classed as wastage. A student who attends for six months, or even three months, will gain something which will be to his advantage in life or at his job. If he does not then the college has not done its job. It may be that the mining industry is by its nature and organization in a better position than others to absorb such students. The fact remains that many students who did not complete a previous course are now, after having attended a shotfirers' and deputies' course, good reliable men all the better for their additional training. The use of the term "wastage" as applied to such men seems unjust and inappropriate.

Experience has shown that older students often make excellent material. They are more mature, they now know what they want and show some determination in getting it, they have a wider practical experience, and, in short, are good poten-

tial undermanagers of the more practical type. There is a tendency now for such students to be shut out. It would appear that there is room for an alternative and less academic route to the Second-class Certificate of Competency, *i.e.*, by some other way than via the Ordinary National Certificate.

The position of undermanager is a vital one in any pit and one which should not just be occupied fleetingly, as a stepping stone, by higher qualified men on their way up to the top. There is room for the good practical man who can lead, but who cannot cope with the mechanics, electricity, and mathematics required for the Ordinary National Certificate, and who will be happy to stay put as an undermanager.

Pitmanship combined with a good knowledge of essential fundamentals are required. Mining courses should provide such knowledge and the student should be examined on his knowledge of the tools of his craft and of their proper application. There is no need for a potential undermanager to reach a very high standard in mathematics and he certainly should not be expected, as he is at present, to attain the same standard as that required by the potential manager. The recent trend has gone too far in this direction.

The reason is probably due to the production of syllabuses up to Ordinary National Certificate level in mathematics which are common to mining, surveying, mining mechanical, and mining electrical students. The mining mechanical and mining electrical students do require a higher standard of mathematics than the mining student. The surveying student gets additional mathematics up to Higher National Certificate level. The same sort of thing repeats itself wherever there is a common syllabus. The standard expected from the different groups of students is too varied for a common syllabus to be satisfactory for all.

It should be remembered that under the present system a student has his day release stopped, in some cases, after one failure, but more usually after two. Such a student will find it very difficult, if not impossible, to obtain ultimately his Second-class Certificate. I should, therefore, like to see the question of wastage dealt with from a more human and less statistical angle.

Attitude of mind to the job is of vital importance. It should be one of the many human aspects of education and training. It may be that the attitude of mind fostered by the colleges, namely, that which tends to develop personality, creates the desire to accept responsibility and to get on with the job and to take a pride in doing it well. The fact that the college student is, during his studies, in closer contact with his practical work, explains the difference between the graduate and the college product—at least during the earlier stages of his training. But one often hears of comparisons which are not in favour of the graduate. The reason may be, I suggest, that during his studies, the university student is further removed from the job than the college student who is on a part-time day release course. In the later stages of training, the graduate, with the right attitude of mind, should make up for any deficiency in this respect. In the long run it is personality in relation to the job and to the men doing the job that counts.

Too much should not be expected from the man who has just completed his training and the system should not be condemned because of some failure of an individual. A person spends some years in training to obtain a colliery manager's or mine surveyor's certificate. He does not, and should not, expect to be the expert right away on completion of his training or on receipt of the necessary certificates. He still requires considerable experience and time to reach maturity.

A Much-needed Incentive

The General Mining Certificate and the City and Guilds Final Certificate have no statutory value whatever and the establishment of an overman's certificate would appear to be an ideal solution and would, without doubt, give a very much-needed incentive to the General Mining Certificate students. Unfortunately, for some reason or other, the NCB or the Mining Qualifications Board will have nothing to do with the suggestion.

The colliery manager no longer is required to be his own mechanical or electrical engineer and the amount of mechanical and electrical engineering required at present in the mining courses could, with advantage, be reduced and the time saved spent on additional mining technology and management. In view of recent emphasis on the need for management studies this would appear to be a desirable aim.

The mining student today is very much over-examined and there are some anomalies in this direction which should be cleared up. For example, a student starting at pre-senior level will spend at least 60 hours in the examination room by the time he obtains his Higher National Certificate and his undermanager's certificate. If the student is successful he will proceed to the National Diploma and manager's certificate. This will involve an additional 25½ hours for the diploma plus two and a half hours for legislation and three hours for mining technology required for the manager's certificate. This makes a total of 91 hours.

If a student obtains the manager's certificate via the associate membership of the Institution of Mining Engineers he will have spent approximately 77½ hours taking examinations. As a comparison, a Higher National Certificate student in mechanical engineering requires only 45 hours, as against the 60 hours required by a Higher National Certificate student in mining.

Again, a graduate or the holder of a National Diploma is required to take papers in mining technology and legislation to qualify for the manager's certificate, but a student who has passed the associate membership examination of the Institution of Mining Engineers is only required to take, in addition, a paper on legislation.

"Getting the Best Out of Coal"

COMBUSTION ENGINEERING ASSOCIATION'S CONFERENCE

Coal technology must be developed to the highest possible pitch of efficiency. Then the coal industry could have confidence in the outcome of the competition with other sources of energy. Dr. C. M. Cawley, chief scientist of the Ministry of Power, used these words in his opening address to the Combustion Engineering Association's conference at Harrogate (Yorks) last week.

CONGRATULATING the association on the theme of its conference, "Getting the Best out of Coal," Dr. Cawley said that the answer to the question, were they getting, here and now, the best out of coal, using existing plant and present knowledge, must plainly be "no." The work of NIFES had shown, over wide sections of industry, that the efficiency of using coal (and, indeed, of other fuels) could be increased by about 15 per cent. for combustion only, by proper attention to operation and maintenance, either with plant already installed or immediately available for installation. The situation was steadily improving, and they had reasonable grounds for optimism in contemplating the progress that was being made in the use of existing plant and existing coal technology.

"I am less sure that we shall maintain our optimism intact as we look further into the future," Dr. Cawley continued. Were they satisfied that everything necessary was being done to develop, on the basis of existing knowledge, improved coal-burning equipment for the general use of industry. Were they quite quite sure they knew what the user's needs were and the shortcomings of existing equipment in meeting them? That was where the value of the conference lay—in bringing together the interests of the user and the manufacturer of equipment, and of the coal supplier and distributor.

Choosing Coal

A lively discussion followed the presentation of papers on "Choosing the Right Coal."

Dr. Armstrong (Imperial Chemical Industries, Limited) said that from a consumer's point of view the zone delivered price basis for coal might be considered most appropriate, particularly in relation to blended coal.

In regard to consistency, it was essential that the fuel supply to the boiler plant should not so suddenly change that the steam output fell. More could be done towards consistency at the washery plants to ensure proper blending and adequate removal of water. He said that one distributor was blending and grading run-of-mine coal at a comparable price to that of the NCB and the consistency was satisfactory.

He suggested that the NCB should set up small modern or modernized demonstration plants. Efficiencies could be much improved by attention to detail, but consideration should be given to the possibilities of inferior coals which might give lower efficiencies, but cheaper steam. A possible alternative would be to provide equipment of greater flexibility with regard to the type of coal.

The difficulty in obtaining smokeless operation at very low burning rates was a challenge to manufacturers. Grit and dust emission was undoubtedly one of the disadvantages of coal-fired equipment, and he suggested that the NCB should supply a "Shopper's Guide" to ensure that the dust arrestors installed were the most suitable for the particular conditions.

A representative of the Unilever organization, after emphasizing that he was expressing a personal view, thought some competition from other coal, as well as from oil, might be healthy. Best Pennsylvania coal was available in Dublin for about 65s. a ton. He understood it could be offered at the same price on the Clyde, Thames, or Severn. When installing new plant one wished to aim at automation. To do this one must have a reasonably good idea what fuel one was going to get and how long it would be available. Could the Coal Board not offer long-term contracts so that consumers could plan automatic coal-fired plants in the same way as they could plan oil-fired plants?

Mr. A. H. Slade said the NCB was quite prepared to enter into negotiations for long-term contracts. But like anybody else in business, it would certainly have to include a clause covering any rise in costs.

Choosing Plant

The difficulty in forward planning in both the steel and glass industries because of the uncertainty of what fuels would be available in 10 years' time was stressed by one discussion syndicate in the section on "Choosing Plant." The syndicate felt that some indication was called for from the Government as to what the fuel position would be

in 10 years' time: if such guidance were available it would be much easier to plan long-term development.

Dr. D. T. A. Townend (BCURA) said that in the ceramic industry there had been a drift over during the war to gas, which had now become too costly at 1s. 2d. a therm. There had now been a change over to oil at 6d. or 7d. a therm. Coal was 6d. or 7d. a therm, but if coal were used capital cost and manipulation of mechanical firing appliances had to be taken into account. Apparently producer gas was not attractive because of the capital cost, labour costs, burn-outs which created clean air problems, and other difficulties. Looking ahead for 10 or 20 years, it would be interesting to know if industry would take advantage of a piped fuel from complete coal gasification at some 360 Btu, at 7d. or 8d. a therm, if such a supply were available in industrial areas. If the feeling of users were known on this, it would be a great help to people at the Ministry who had to consider the recommendation of the Wilson Committee.

The president, Mr. N. A. McNeill, observed that if somebody would make available to his company heat energy in the form of a suitable gas they would be more than ready to negotiate, but until they knew the true economics of such a supply, which would probably be not for some time, they could not get very far.

Operation and Maintenance

Discussion on the papers on operating and maintaining plant threw up interesting points concerning pulverized fuel firing of shell boilers, the use of producer gas in intermittent kilns producing blue ware, and the minimum size of boilerhouse necessary to make the installation of mechanical handling economical.

In reply to one discussion syndicate which asked whether there was any future in firing shell boilers with pulverized fuel, Mr. P. Tate (National Coal Board) doubted whether there was much future in this field. He thought the board had the widest variety of plant of this type that anybody could have. His reason for doubting the future of pulverized fuel in this sphere was the difficulty in getting grit emission down to an acceptable level.

Mr. A. F. Webber (Webber & Varlow) disagreed with this view. He believed that pulverized fuel firing had a real, if limited, future in the shell boiler field. He could not see it ever becoming a standard method of firing, but in certain cases, for instance, where a high load factor, over the year, gave value for the admittedly high initial cost of the pulverizing equipment, it could prove suitable.

A syndicate discussing the operation of kilns got rather involved with the question of smoke emission from intermittent kilns, particularly those manufacturing blue ware. It was suggested that it might be necessary to include in the design of such kilns an after-combustion chamber separately fired to reduce smoke, but Mr. M. S. Gaskill (West's Gas Improvement Company, Limited) put in a strong plea for firing with producer gas.

In the final discussion rounding up the conference, Mr. J. S. Williams (NCB) referred to the work of the board's development branch. He said they were trying to help manufacturers of coal appliances to get promising developments on to the market. Secondly they would make better known the best of the existing plant and promote the sale of the new technical developments which emerged. The National Coal Board was proposing to extend into the commercial and industrial sphere for the smaller type of firm the benefits of the loan scheme already being operated in the domestic field. Thirdly, in the sphere of publicity, they were proposing to spend money next year on a quite unprecedented scale in an effort to restore the confidence of public and consumers in coal.

Review of Current Practice

Some very high level machinery had been set up in the board to review all that was best in current practice, particularly on the Continent, and in the light of that to see what technical developments were needed. They also needed to decide who should be responsible for undertaking the developments. He thought much of the burden would fall upon the appliance industry. The board was prepared to be receptive to ideas for financial help in this regard.

"Before long we shall be seeking a common meeting ground with equipment makers, leading coal distributors, and consumers as to how best to meet their needs and our needs," said Mr. Williams.

Summing up, Mr. N. A. McNeill said there were four major points. Firstly, support for the National Coal Board. If there was any case at all for promoting the use of coal and promoting it on an economic basis this could be only be done by giving it all the support it needed.

Secondly, the very great need for quick development and very much more development in methods and appliances and the treatment of fuel.

Thirdly, much development work was required in the gasification of solid fuels as a means towards getting a heat energy derived from coal at the consuming end at a price that could compete safely with other fuels.

Fourthly, the co-ordination between parties. A number of people had suggested the need for that for various reasons. One was to help consumers in selecting the right fuel, towards the greater development of appliances and the development of new methods of using existing fuel, towards determining what were the real needs of the user in regard to fuel quality and what limitations could be permitted. The chairman thought that the interested parties in that field were the National Coal Board, the appliance manufacturers, and the user who paid for the fuel. They would have a call on all the scientific associations and everyone else who could provide the truly scientific advice. That should be an effort right through the industry and the research units. He thought that there was logic in the suggestion that the Combustion Engineering Association could very well be a forum for forming such a group.

COMBUSTION CONTROL

of Open-hearth Furnaces

Furnace production rate can be increased and fuel consumption reduced by using a paramagnetic oxygen analyser to control the intake of air to an open-hearth furnace. The results of development work by the British Iron and Steel Research Association in this field are summarized below.

THE air supplied to an open-hearth furnace is used for two purposes:— (1) To burn the fuel; (2) to provide the oxygen needed for metallurgical reactions in the furnace. Combustion control is provided on many furnaces by a fuel/air ratio controller, together with a furnace-pressure controller which limits the amount of air drawn in through furnace doors, etc., to the practicable minimum under these conditions. This type of control system is not really adequate because the ability of the steel to accept oxygen varies from heat to heat, from reversal to reversal, and even within a reversal.

A control system is needed which will provide sufficient oxygen for the metallurgical reactions without allowing combustion to become inefficient through using too much air. Such a system can be based on the use of a paramagnetic oxygen analyser, the purpose of which is to monitor continuously the oxygen concentration in the waste gas from the furnace.

Optimum Air Requirement

Each gallon of fuel oil needs 150 cu. ft. of air for complete combustion, and a control linkage from the oil and air meters may be used to ensure that fuel and air is delivered to the furnace in this ratio. When the furnace operates with this kind of fuel/air ratio controller the quantity of combustion air supplied to the furnace is automatically adjusted so as to be sufficient for the combustion of the fuel, with some excess air to provide for the combustion of carbon monoxide from the metal in the furnace. However, the evolution of carbon monoxide proceeds at an unpredictable and irregular rate, so that from time to time the furnace is operating with more or less than its optimum air requirement.

This means that for complete control of combustion it is necessary to assess continuously the oxygen requirement of the metal in the furnace. The quantity of oxygen in the gases leaving the furnace shows whether the correct amount of air for both fuel combustion and furnace oxidation is being supplied to the furnace. The signal from a paramagnetic oxygen analyser can, therefore, be used continuously to adjust the quantity of air supplied to the furnace so as to give more complete control of combustion than is possible with a fuel/air ratio controller.

The first step in applying the analyser is to construct and operate a reliable gas-sampling system which, together with the analyser, will give the fast response necessary to operate a control. A sampling system which satisfies this requirement has now been developed, and can be installed at the stage level of any furnace having steam, cool water, and a drain available below stage level.

This sampling system, which is shown in Fig. 1, uses a steam ejector to compress the sample to 6-8 lb./sq. in. (gauge). Water is sprayed into the mixture of sample and steam, and the cool, clean sample can then be transmitted along anything up to 200 ft. of ¼-in. copper tube to the analyser, while the water collects in a separator and is allowed to flow to a drain. Output is from ½ to 1 cu. ft./min. of sample at 6-8 lb./sq. in. (gauge), which is sufficient to sweep out the system in a few seconds; and the overall delay time in the furnace sampling system and analyser is sufficiently small to give a response at the analyser 20-30 sec. after a sudden change in the fuel/air ratio at the burner, and 90 per cent. response in 45-50 sec. Little maintenance is required and a

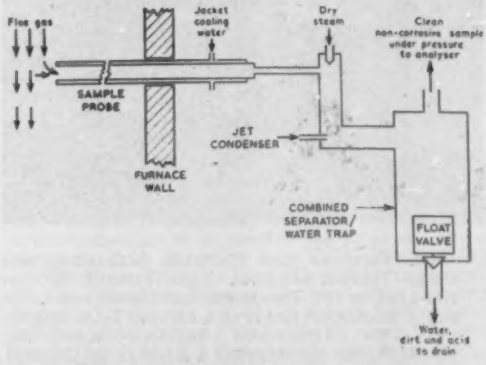


FIG. 1.—WASTE-GAS SAMPLING SYSTEM.

* The relevant report is SM/AH/123/59, "Waste-gas Analysis for Open-hearth Furnace Combustion" by D. Meachen.

thorough weekly overhaul will keep the equipment running reliably for long periods.

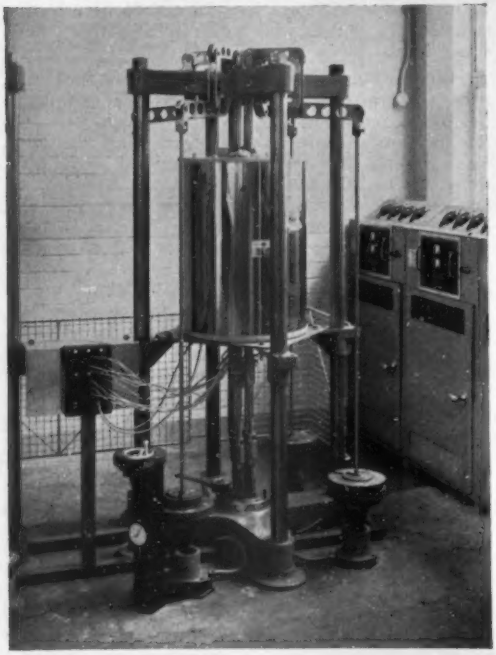
A separate sampling system must be provided at each end of the furnace, and when the furnace reverses it automatically transmits a signal which opens a valve controlling the sample at the waste-gas downtake and closes the valve controlling the sample from the air uptake. Experimentally this system has been used on an open-hearth furnace, with an operator manually controlling the furnace air damper so as to give a constant concentration of oxygen in the waste gas.

The next stage in the development is to arrange a control linkage to the air damper so that combustion is automatically controlled by the analyser signal.

This has not yet been tried on a British open-hearth furnace, but there is such a control operating on a soaking pit. The control of a soaking pit is basically similar to the open-hearth furnace, but the conditions are less arduous and a simpler sampling system can be used. At this pit a fuel/air ratio controller is used and the signal from the oxygen analyser changes the value of the fuel/air ratio within a limited range to give a constant exit gas composition. The range of operation of the analyser control is limited so that when a sudden change, too fast for the response of the analyser, occurs, reasonable control action is taken during the short period before the analyser can accurately follow the change. At this pit, combustion control with an oxygen analyser has improved pit operation and reduced fuel consumption.

MULTI-SPECIMEN CREEP TESTING MACHINE

NOW being built and marketed by the Distington Engineering Company, Limited, Workington, is a compact creep testing machine which is expected to have many applications in industries concerned with the design and manufacture of steel parts for service conditions in steam boilers and turbines, gas turbines, and certain chemical plant.



GENERAL VIEW OF THE UNISTEEL MULTI-SPECIMEN CREEP TESTING MACHINE. THE TERMINAL BOX ON THE LEFT IS FOR THERMOCOUPLE CONNECTIONS. IN THE FOREGROUND (LEFT) IS A LIFTING JACK, ONE OF THE TWO AUXILIARIES SUPPLIED WITH THE MACHINE. ON THE RIGHT IS A BATTERY OF CONTROL PANELS—ONE IS PROVIDED FOR EACH MACHINE.

Designed by the research and development department of the United Steel Companies, Limited, the Unisteel multi-specimen creep testing machine is designed to accommodate either four high-sensitivity tests or 12 stress-to-fracture tests on the one machine, with one furnace and one temperature controller. The machine incorporates four loading systems, each of which caters for one high-sensitivity test or three stress-to-fracture tests in series.

The machine occupies a floor space of little more than a square yard and can be installed in rows at 4-ft. centres. It can be used for the application of loads up to 3 tons on a specimen. The complete unit comprises the creep testing machine itself; a furnace consisting of a fused silica tube wire wound in three zones for resistance heating, encased in a polished stainless steel cylinder; a control panel, incorporating an electronic temperature controller; and two auxiliaries—a ratchet spanner and lifting jack—which can be used with a number of machines.

"Metallurgical Research at High Pressures"

Dr. J. E. Hilliard, of the research laboratory, General Electric Company, Schenectady, US, is to give a lecture on "Metallurgical Research at High Pressures," under the auspices of the Metal Physics Committee of the Institute of Metals. The meeting will take place at the institute's headquarters, 17, Belgrave Square, London, S.W.1, on January 12, at 6.30 p.m. Visitors will be welcome; tickets are not required.

A HYDROLOGICAL SURVEY of the river Severn basin by the Surface Water Survey of the Ministry of Housing and Local Government has been published by HM Stationery Office (17s. 6d. net).

IMPERIAL COLLEGE

OF SCIENCE AND TECHNOLOGY

Research Report for 1957-1960

COVERING the years 1957 to 1960 and summarizing the principal researches undertaken during the last three years in the wide field of mineral engineering within the Imperial College has been issued by the Royal School of Mines. The work has been carried out chiefly by members of the teaching staff and postgraduate students.

In the Department of Geology it covers mining geology, applied geochemistry, oil technology, and applied geophysics, in the Department of Metallurgy it covers extraction metallurgy and physical metallurgy, and in the Department of Mining, mineral dressing and mining are covered.

During the period under review, considerable inconvenience has been experienced in the laboratories due to the extensive rebuilding operations in progress in the immediate vicinity. Of necessity, some space has had to be surrendered as a hostage to future expansion, but, thanks to the enthusiasm and ingenuity displayed in the development of temporary adaptations, it has been found possible to accommodate an even increased number of research workers in the building.

Unprecedented Activity

DEPARTMENT OF GEOLOGY.—The past three years have marked an unprecedented activity in mining geology research, and investigations have been made of a wide variety of economic mineral deposits. In addition to studies in the British Isles, oversea field research has been concerned with diverse types of deposits, ranging from copper in South America to lead-zinc in Australia, and from vanadium in Africa to uranium in Canada. These investigations, covering mineralization processes, genesis and structural control, are briefly described in the report under headings relating to the various metals concerned.

A large-scale programme of ore microscopy research has also been initiated, devoted to a complete re-examination of the fundamental properties of ore minerals in polished sections. This programme aims to establish precise quantitative methods for the determination of opaque economic minerals. Up to the present time, the specific properties studied include microhardness, reflectivity throughout the spectrum, reflection pleochroism and anisotropy phenomena.

DEPARTMENT OF METALLURGY.—Extraction metallurgy research related to the recovery and refining of metals is carried out in the Nuffield Research Group. Almost all the group's work has been directed towards establishing the chemistry underlying pyrometallurgical processes. Temperatures have ranged up to 2,500 deg. C. and pressures up to 250 atms. The systems investigated have included molten metals and alloys, silicates and slags, halides, oxides, sulphides, sulphates, carbonates, and volatile metal compounds. In the main, the topics for investigation have been selected on the basis of their broad interest and the extent to which they are likely to aid in the development of the theory of chemical metallurgy. Nevertheless, most of the reactions and systems that have been studied are closely connected with existing or potential processes: much of the work is related to the winning of metals important for the production of nuclear power.

Research work in physical metallurgy is mainly concerned with the mechanical behaviour of crystals, the constitution of alloys, and with certain aspects of corrosion. The principal function of work on the first of these subjects is to further the understanding of the mechanism of deformation processes. Most of the work is on metals and alloys, but considerable attention is also being given to ionic and ceramic crystals; similar defects occur within crystals of both groups of materials and deformation behaviour is controlled primarily by these defects. The alloy constitutional work deals with the solid state and, to a limited extent, with liquid-solid equilibria. In the solid state work, studies are made both of the equilibrium condition, and of the factors that influence the approach to equilibrium through metastable conditions. In some topics, the influence of constitution on properties is being determined.

DEPARTMENT OF MINING.—Work carried out in connection with mineral dressing included various aspects of flotation, gravity concentration, high-tension separation, pelletizing, and dense media hydrocyclones. Mining investigations included ventilation, heat transfer, rock mechanics, and surveying.

Iron Ore Search in Queensland

It is reported that the Broken Hill Proprietary Company, Limited, has taken up large areas in Queensland under authorities to prospect. The areas are centred round the Iron Range on Cape York Peninsula and the Constance Range in far north-western Queensland, near the Northern Territory border. The company's geological teams are actively exploring both areas, in which iron-ore desposits are known to exist. The areas are far removed from the company's furnaces in New South Wales.

British Iron and Steel Industry Translation Service

FOLLOWING is a list of some new translations available from the Iron and Steel Institute under its translation service scheme. Translations are all classified by numbers, and these should be quoted on application, which should be addressed to the institute at 4, Grosvenor Gardens, London, S.W.1.

1678: "The Causes for the Disintegration of Hot-blast Stove and Checker Bricks Made of Fire-clay." S. KIENOW. Stahl u. Eisen, 1960, Mar. 3, pp. 285-289. £3 15s.

1701: "The Decade System for Automatic Positioning of the Edging Stand Screw-down." K. STROBL. ELIN-Zeitschrift, 1958, Mar., pp. 12-29. £5 5s.

1729: "The Transport of Large Quantities of Material as an Engineering Problem in Modern Iron and Steel Technology." K. H. HÜSER. Stahl u. Eisen, 1960. Jan. 7, pp. 1-12. £7.

1768: "Investigations into the Recrystallization of an Austenitic Chromium-nickel Steel with Special Stress on Prolonged Heating." H. BORCHERS, *et al.* Arch. Eisenhut., 1960, April, pp. 237-242. £3 5s.

1771: "Contribution to the Spectrochemical Micro-analysis of Oxide Inclusions Isolated from Steels." K. F. LUDEMANN, *et al.* Neue Hütte, 1960, April, pp. 238-244. £4.

1778: "The Economics of a Continuous Light-section Rolling Mill." W. A. ANTONI and E. SCHNEIDER. Stahl u. Eisen, 1960, May 12, pp. 641-652. £8 5s.

1781: "What is New in the Aluminizing of Iron." V. I. KARASEVICH and V. E. PRIKHOD'KO. Tsvetnye Met., 1959 (10), pp. 68-75. £5 5s.

1787: "Starting Torques for Tightening Bolted Joints." R. KELLERMANN and H.-CH.KLEIN. Werkstatts-technik, 1960, Apr., pp. 192-5. £2 5s.

1794: "Spectrophotometric Determination of Small Amounts of Niobium and Tantalum in Stainless Steels." R. ROSOTTE and E. JAUDON. Chim. Anal., 1959, June, pp. 229-239. £3 15s.

1809: "Thermoelectric Method of Measuring the Metal Surface Level in Continuous Casting." A. ELKERSHAUSEN. Neue Hütte, 1960, Jan., pp. 31-36. £4.

1811: "Metallurgical Considerations in the Welding of Stainless and High-temperature Steels." A. BERNSTEIN. Schweissen u. Schneiden, 1960, Feb., pp. 55-61. £4.

1816: "Brittleness of Special Steels in the As-cast Condition; Influence of Impurities." R. CASTRO and A. GUEUSSIER. Rev. Mét., 1960, Feb., pp. 135-148. £7 5s.

1825: "Shrinking Wheels onto Axle Shafts." A. WÄCHTER. Deutsche Eisenbahntechnik, 1960 (2), pp. 84-86. £2 5s.

1829: "Continuous Railway Tracks." J. F. DEENIK. Der Eisenbahn Ingenieur, 1960, July, pp. 203-207. £4.

1830: "The Reprofiling of Used Rails at the Saint Dizier Workshops." M. WAUTHIER and M. VENNIN. Rev.Gén.Chem.Fer, 1960, July/Aug., pp. 401-3. £1 15s.

1833: "Contribution to the Problem of the Life of Steel Moulds for Centrifugal Casting." H. BÜHLER. Stahl u. Eisen, 1959, Nov. 12, pp. 1722-1730. £5 10s.

1834: "Studies on the Life of Steel Moulds for Centrifugal Casting." A. KÖNIGER and W. LIEBMANN. Stahl u. Eisen, 1959, Nov. 12, pp. 1730-42. £8 15s.

1837: "A General Outline of the Work of TsNIITMASh (Central Scientific Research Institute for Technology and Engineering)." TSENTRAL'NYI MAUCHNO-ISSLEDOVATEL'SKII INSTITUT TEKHNOLOGII I MASHINOSTROENIYA, Moscow, 1959, 79 pp. £5.

1867: "Effect of the Nature of the Wood on the Corrosion of Light-alloy Screws in Sea Water." C. PANSERI and G. LUFT. Alluminio, 1960, Jan., pp. 5-20. £7 10s.

1880: "Experiments on the Automatic Ultrasonic Testing of Welds." J. ANGRES. Schweisstechnik, 1960 (4), pp. 124-127. £3 5s.

1883: "Condensation Method of Dust Separation for Precipitation of Mining Dust." B. V. DERYAGIN and M. L. MIKHELSON. Izvestiya A.N.SSSR, OTN, Met.Topliva, 1959, 2, pp. 124-138. £6 5s.

1914: "Effect of Stability of a 0.5 per cent. Cr.-0.5 per cent. Mo Steel on the Rupture-time Curve at 500 deg. C. L. BÄCKER, *et al.* Int. disc. on "Long-time Behaviour of High-temperature Steels," Düsseldorf, 1960, June 24 and 25, paper No. 12. £2 15s.

1921: "The Granulation of Reducing Manganese-bearing Slags." D. S. CHIKASHUA, *et. al.* Stahl', 1957, July, pp. 611-615. £4.

1571: "The Combined Platinum-carbon Evaporation as a Preparatory Technique in Electron Micrography." F. W. GÜNTHER and D. RAAB. Neue Hütte, 1959, Feb., pp. 113-115. £1 10s.

1686: "Fault Location in Sheets by Ultrasonic Lamb Waves." H. WIEGAND and H. HENTZE. Material-prüfung, 1960, Feb. 20, pp. 45-50. £4 15s.

1711: "The Reaction of Metallurgical Workers to Technical Innovations." E. A. JÜRES. Stahl u. Eisen, 1960, Mar. 31, pp. 429-437. £4 10s.

1724: "The Dr. Förster Institute (for Non-destructive Testing), Rentlingen." F. FÖRSTER. Material-prüfung, 1960 (2), pp. 65-68. £3 10s.

1766: "The Effect of the Duration of the Load on the Hardness of Metals and Their Alloys." V. P. SHISHOKIN. Zhur. Tekn. Fiziki, 1938, 8 (18), 1613-1628. £6 10s.

1767: "Development of the Open-hearth Furnace with a New Profile." E. BOELENS. Radex Rund., 1960, Apr., pp. 71-85. £5.

1797: "The Nature of the Solid Solution of Boron in Alpha-iron." A. K. SHEVELEV. Dok. Akad. Nauk, 1958 (3), pp. 453-456. £3.

1801: "9 per cent. Cr-1 per cent. Mo Steel Tubes for Use in Modern Power Boilers." J. OMORI, *et al.* Sumitomo Met., 1955, Apr., pp. 98-109. £10.

1843: "The Rourkela Iron and Steel Works in India." H. HEINRICH. Stahl u. Eisen, 1960, Feb. 18, pp. 197-206. £5 10s.

1879: "The Steel Tube as Structural Element." W. JAMM. Tech.Mitt., 1959, Mar., pp. 89-94. £4 5s.

1882: "Improved Heat Transfer to Water Through Artificial Roughening (Grooving) of Surfaces in Reactors or Heat Exchangers." G. GRASS. Atomkern-Energie, 1958 (8/9), pp. 328-331. £2 15s.

1886: "The Development and Introduction of a New Ferritic Steel for Superheated Steam Pipes and Superheater Tubes." O. L. BIHET, *et al.* Int. disc. on "Long-time Behaviour of High-temperature Steels," Düsseldorf, June 24 and 25, 1960, paper No. 13. £4.

1888: "Swedish Proposals for Definitions of Terms Used in High-temperature Testing and for the Corresponding Abbreviation Symbols (in Particular for Static Load Testing)." G. ENGSTRAND. Int. disc. on "Long-time Behaviour of High-temperature Steels," Düsseldorf, June 24 and 25, 1960, paper No. 34. £1 10s.

1890: "Load on Roller Bearings in the Stands of Continuous Rod Mills" (with discussion). H. MÜNNICH. Stahl u. Eisen, 1960, Aug. 18, pp. 1136-1147. £9.

1893: "Equilibrium of Sulphur Reaction Between Liquid, Carbon-saturated Iron, and Lime-silica-alumina Slags." H. SCHENCK, *et al*, Arch. Eisenhüt., Aug., pp. 471-472. £1 15s.

1899: "Resistance to Flow in Branch Pipes." G. GRASS and E. LÜTH. Allgemeine Wärmetechnik, 1958 (9), 185-189. £2 10s.

1915: "Influence of Cooling Rate, Heat Treatment, and of Solidification Cross-section on Room Temperature Properties and on Creep Behaviour of a Cast Steel with 1 per cent. Cr, 0.9 per cent. Mo, and 0.3 per cent. V." K. GUT and H. LÜLING. Int. disc. on "Long-time Behaviour of High-temperature Steels," Düsseldorf, 1960, June 24 and 25, paper No. 17. £3 10s.

1916: "High-temperature Behaviour of Cr-Mo-V Steels: The Influence of Thermal Treatment—Comparison Between the Results Obtained on Rotors and on Bars for High-temperature Bolts. C. ROQUES and LE CREUSOT. Int. disc. on "Long-time Behaviour of High-temperature Steels," Düsseldorf, 1960, June 24 and 25, paper No. 22. £2 5s.

1919: "Results of a Comparison Between the Plug Mill and Pilger Mill Processes." S. I. BORISOV. From book: "Proizvodstvo trub na ustanovkakh s avtomaticheskimi i piligrimovymi stanami," 1959, Metallurgizdat, Khar'kov. Ch.8, pp. 320-6. £3 5s.

Simplified Short-circuit Calculations

WHEN a short-circuit occurs at or beyond a group motor control or distribution switchboard, the resulting fault current can be of such magnitude as to be the cause of damage to both switchgear and cables due to thermal and mechanical (electromagnetic) effects. The thermal problem is one which is related to the time during which the fault current flows and what this time is depends on the characteristics of the nearest automatic protective device which should operate to clear the fault. The purpose of a book entitled "Simplified Short-Circuit Calculations" (as related to 400-600 volt group motor control and distribution switchboards) by R. T. Lythall, M.I.E.E., is to show how, by the use of simple arithmetic involving only the ability to add, multiply, divide, and extract a square root, short-circuit values of sufficient accuracy for the purpose in mind can be calculated.

In most applications, the circuits involved are not complex, comprising generally simple series or parallel sections without the involved interconnections which occur on high-voltage supply networks. On this simple basis it is possible for a considerable amount of the basic arithmetic to be done in advance and the results tabulated so that the user has only to read off appropriate figures from the tables and with these perform the simple calculations as demonstrated in the worked examples given.

The book has been published by the Belmos Company, Limited, Bellshill (Lanarkshire), and is priced at 5s.

Magnetic Separator for Low-grade Iron Ore

August issue of Revue de l'Industrie Minerale contains (pp. 669-677) a paper by J. de Robert and L. Casnabet entitled "The Forrer Separator, a New Apparatus for the Wet-sorting of Slightly Paramagnetic Substances," describing a magnetic separator which has given promising results with Lorraine iron ore. The following is a summary of the paper.

THE Lorraine ore is available in great quantities, but poor grade (a little over 30 per cent. Fe) and is generally composed of oolites with 50 per cent. iron, particles of quartz, and variable bond.

Some thought must therefore be given to its concentration. It has been shown that magnetic separation at the level of the oolites is possible. This separation is facilitated in machines with rotor armature after drying. However, the latter operation enters, very largely, into the cost price of the treatment.

The forces which can be exerted on paramagnetic particles of rather feeble magnetic susceptibility are normally insufficient to overcome the resistance of water. Such magnetic sorting in water is *a priori* difficult.

The principle of the Forrer machine is to create by a system of pole-pieces on opposite sides an air gap in which the magnetic field is strong, but where the lack of uniformity of this field is also great (this is the magnetic chute). The paramagnetic or slightly ferro-magnetic particles follow this chute when the mixture of water and products to be sorted comes to pass this chute at right angles to its length.

The Forrer machine was compared with the magnetic separator for various ores.

Over the size distribution from 200 to 400 micron, the weight of concentrate and the rate of recovery are a little higher with the classic machine.

The adjustments which have to be carried out and which can surely be overcome will provide a separation process at small cost (energy consumed for the excitation is 1 kW/hr. per ton treated). Other possibilities will certainly arise for the Forrer machine, specially for sorting fine particles.

Coke Oven Managers' Year-book

The 1960 edition of the "Year-book" of the Coke Oven Managers' Association is now available. It includes a report of the annual general meeting and presidential address by Mr. H. J. Victory, B.Sc., together with a list of members, rules of the association, and a report of the Transactions. A valuable feature of the volume is the usual information relating to coke-oven plants in Great Britain, the United States, and other countries abroad. The "Year-book" is published by C.O.M.A. (Year Book), Limited, 1, Cliff Street, Mexborough (Yorks).

COLLIERY MANAGERS' 1961 CONFERENCE

NEXT year's annual conference of the National Association of Colliery Managers will be held at Edinburgh and will, as previously announced, open on a Tuesday. The dates of the conference are June 6, 7, and 8.

Members are urged to bear in mind that the association cannot on this occasion undertake the booking of hotel rooms. It is also important to remember that hotels in Edinburgh tend to be booked quickly in June, so that early application for accommodation is strongly advised.

Headquarters of the conference will be at the North British Hotel, while the technical sessions and most of the social events will take place, according to present arrangements, at the Assembly Rooms in George Street.

The publicity officer of Edinburgh Corporation, Miss L. R. Rhind, City Chambers, Edinburgh 1, will gladly send, on application, a full list of hotels and other accommodation. Some of the principal hotels are listed below, the price stated being the approximate cost per person of room and breakfast.

Licensed Hotels. — Caledonian, Princes Street, 48s. 6d. Carlton, North Bridge, 32s. 6d. Clarendon, Grosvenor Street, 35s. George, George Street, 50s. Grosvenor, Grosvenor Street, 27s. North British, Princes Street, 48s. 6d. Royal British, Princes Street, 35s. Royal, 53, Princes Street, 32s. 6d. Rutland, Rutland Street, 26s. 6d.

Unlicensed Hotels.—Adam Hotel, 19, Lansdowne Crescent, 25s. Green's, 24, Eglinton Crescent, 30s. Old Waverley, 43, Princes Street, 28s. 6d. Palmerston Place, 56, Palmerston Place, 25s. Rothesay, 7, Rothesay Place, 27s. 6d. Royal Stuart, 18, Abercrombie Place, 33s. St. Andrew, 3, St. Andrew Street, 23s.

French and English Technical Dictionary

Fifth edition of a pocket size (6¼ in. by 4¼ in.) English/French French/English technical dictionary, compiled by Francis Cusset, a mining engineer, has recently been published by Editions Berger-Levrault, 5, Rue Auguste-Comte, Paris VI. Metallurgical, mining, electrical, mechanical, and scientific terms are covered in the dictionary's 663 pages.

National Coal Board Specifications

SPECIFICATIONS recently issued by the National Coal Board include those mentioned below. The charge for each specification is 6d. unless otherwise stated.

No. 195 (price 2s.) covers the standard 30-amp. rated flameproof airbreak electrically operated gate-end box for use on three-phase, 50 cycles, a.c. circuits up to 650 V for controlling small motors of up to approximately 20 h.p. rating.

No. 196 covers quicklimes and hydrated limes, but not eminently hydrated limes, natural cements, and lime ashes.

No. 201 specifies requirements for asphalt consisting of aggregate which passes ¼-in. BS sieve, and asphaltic cement. The material is suitable for laying either cold or at a low temperature.

No. 203 gives requirements for the composition, manufacture, sampling, and testing of ordinary and rapid-hardening Portland cement.

No. 205 is limited to furnace clinker for use as aggregate in unreinforced concrete and precast concrete units and provides for aggregate for use in plain concrete for general purposes, aggregate for use in concrete *in situ* for interior work not exposed to damp condition, and aggregate for precast concrete blocks.

No. 206 refers to plasters used in general building operations and in the manufacture of preformed building products which have a set due to the hydration of calcium sulphate to form gypsum.

No. 207 refers to the manufacture and supply of mixed gravel aggregate and road tar, or bitumen mixtures for the construction of base courses, single courses, and wearing courses of medium texture containing substantial proportions of fine aggregate.

No. 208 deals with the manufacture and supply of tarmacadam made with crushed rock or slag aggregate together with a binder of road tar or of tar-bitumen mixture for various forms of surfacing for carriageways and similar constructions.

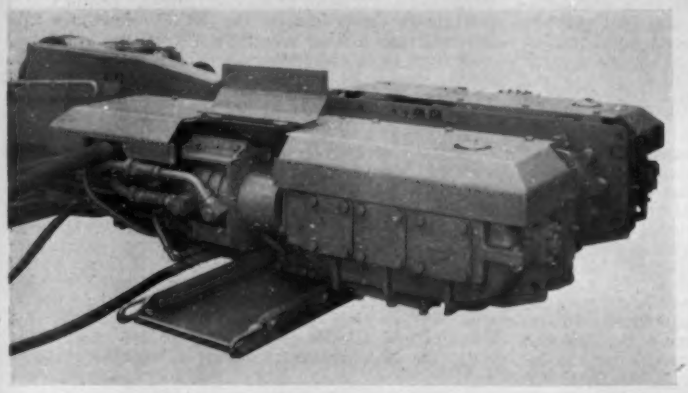
US Coal Production at Record Rate

THE 412,000,000 tons of bituminous coal and lignite produced in the US last year exceeded the 1958 output by less than one-half of 1 per cent., but workers produced it at a rate nearly six times higher than that for any other country in the world, the Bureau of Mines, US Department of the Interior, reports.

Final statistics for the bituminous coal and lignite industry in 1959 show an increase of 0.4 per cent. over the 410,400,000-ton output recorded in 1958. Last year's extended steel strike and reduced coal exports are stated to be largely responsible for the relatively small gain. Productivity, however, reached a new high level of more than 12 tons of coal per man per day, an advance attributed mainly to increased mechanization. According to the bureau, a record 86 per cent. of coal produced underground was loaded mechanically in 1959. The increase in output per man-day is nearly a ton over 1958, when slightly less than 85 per cent. of underground production was loaded mechanically.

Hydraulically Driven Armoured Conveyor

PROBLEMS associated with the adequate supply of compressed air at collieries have faced the mining industry for many years, particularly where gassy conditions have precluded the use of electricity on the face. With the introduction of modern direct oil pumping systems and compact large power weight ratio motors, hydraulically driven conveyors became a possibility and, in 1951, a conventional 25-h.p. face belt drive head was converted to hydraulic drive. This ran two years until the district finished. Since this time other units have been installed, but it was late in 1958 before the first attempt was made to transmit a large horsepower or to transmit hydraulic power through long pipelines; this was the beginning of the hydraulically driven Armadillo conveyor, manufactured by Richard Sutcliffe, Limited, Wakefield (Yorks). Prior to this development compressed air was the only alternative source of power on the face when electricity could not be used.



THE ARMADILLO CONVEYOR DRIVE HEAD POWERED BY TWO HYDRAULIC DOUBLE-PUMP UNITS.

The use of hydraulic power is much cheaper than the use of compressed air. Hydraulic transmission for the Armadillo is achieved by circulating oil from a pump to a motor, both of which are identical in design. The system works on a closed circuit and an oil tank is included to allow for cooling and oil expansion. In addition to a pump and a motor, there is a stop/start reversing valve fitted in the pressure and exhaust lines connecting the two units. The motor can thus be stopped or reversed without stopping the prime mover. There is also a relief valve which diverts the oil back to the tank if the oil pressure rises above a predetermined figure.

The pumping set is separated from the driving head by 100 yd. of pipes and four pumps are used to drive one hydraulic motor, their outputs being brought into the feed line in pairs so that the oil is accelerated in two stages. This also allows the motor to be run at two speeds. The power pack consists of a 250-gal. steel tank fitted with wheels suitable for running on the tub track. The size allows for cooling and for oil running back from the pipelines when the gate is rising to the face. Full flow filters are fitted in the wells at the bottom of the tank and baffles provided to circulate the oil round a long path and dissipate its heat through the sides and top of the tank. An oil cooler is also fitted.

On the same track adjacent to the tank are fitted the pump bogies, one at the front and one behind. Both bogies consist of a double pump unit, each pump having an output of 28 gal./min. Mounted at the rear of the set is a pilot pump with an output of 4 gal./min. All the pipes between the bogies and the tank are flexible.

There are a number of very important safety aspects with the hydraulically driven Armadillo. The drive head is very much smaller in size and requires only 35 sq. ft. of floor area, compared with 56.5 sq. ft. for the air-driven machine. This means that the prop setting can be much closer—5 ft. 4 in., compared with 6 ft. 4 in. when a compressed-air drive is used. Stopping time is also greatly reduced; the hydraulically driven Armadillo will stop within 2 ft. of travel.

The machine is quiet in operation and there are no exhaust vapours. The hydraulically driven machine affords the degree of visibility as can be expected from electric motors.

SAVING TIME UNDERGROUND

DEVELOPMENT of an idea to save time down the pit has earned a cash award for Mr. A. M. Woodward, unit engineer (electrical), and Mr. R. Dunn, colliery bellman, of Thornley Colliery, in the NCB's Durham Division. Their invention is a quick-release signal bracket for an armoured conveyor. The purpose of the device is to facilitate quick replacement of cable or hydraulic pipes located in a trough, formed by brackets, in the conveyor structure on the goaf side of the armoured conveyor.

The awards were presented to the two men by Mr. L. C. Timms, No. 3 Area general manager, at a meeting of Thornley Colliery Consultative Committee.

THE VENEZUELAN Ministry of Mines has stated that the Government will not authorize mining concessions in respect of iron, manganese, and nickel ores, and bauxite. Furthermore, the Ministry will maintain a strict watch over all existing concessions still in force.

New Literature

NEW catalogues, booklets, and other publications which have recently been received include those mentioned below. Readers wishing to obtain a copy of any of the publications referred to should apply direct to the address given, at the same time mentioning IRON AND COAL.

E. BOYDELL & COMPANY, LIMITED, Old Trafford, Manchester 16—News of "Muir-Hill" dumpers, loaders, and shunters is contained in the November issue of the Boydell Bulletin.

GRAPHITE PRODUCTS, LIMITED, Northfields, Wandsworth Park, London, S.W.18—L.585 is a concentration of approximately 11 per cent. colloidal graphite dispersed in white spirit. A reduced concentration may be obtained by dilution with either white spirit or paraffin. A new leaflet, GP.62/60, is available.

EDGAR ALLEN & COMPANY, LIMITED, Imperial Steel Works, Sheffield 9—"Manufacture of Weldless Steel Tubes," "The Machining of Steel," "The Heat-treatment of Steel," and "The Metal-arc Welding of Stainless Steels" are among the technical contributions in the November issue of Edgar Allen News.

MARTONAIR, LIMITED, Parkshot, Richmond (Surrey)—Latest issue (No. 26) of the Journal of Applied Pneumatics (price 1s. 6d.) contains articles on "Cleaning Automobile Components," "Pneumatic Machines in Bowling Alleys," "Automatic Controls for Capstan Lathes," "Air-operated Guillotine," and other subjects.

HENRY SIMON (HOLDINGS), LIMITED, Cheadle Heath, Stockport (Ches)—The Simon Magazine, the October number of which is to hand, is a journal for and by the employees of the Simon group. Mr. Anthony Simon contributes an extensive review of the group's activities, while the remainder of the 64 pages are filled with interesting news items, the whole being attractively presented.

LIGHTNIN MIXERS, LIMITED, Poynton (Ches)—The company (formerly the UK mixer division of Stockdale Engineering, Limited) has produced "Fluid Mixing," a new technical film in sound and colour for the process industries. A pamphlet details the scope of the film, which is available for a group showing. A second pamphlet gives information on laboratory mixers for heavy duty work.

TUBE INVESTMENTS, LIMITED, The Adelphi, London, W.C.2—"Extended Surface Tube" is the title of a new brochure, which describes the wide variety of extended surface tube now being made by TI subsidiary companies. A number of the tubes were originally designed for nuclear power stations, but all are now finding important applications in the oil, chemical, and power producing industries.

IMPERIAL CHEMICAL INDUSTRIES, LIMITED, Imperial Chemical House, Millbank, London, S.W.1—Twopence is, as we have remarked before, an extremely modest outlay for a copy of the ICI Magazine, which, month by month, must bring a great deal of pleasure to a large number of readers. The contents of the November issue are as varied as ever and, as usual, are supported by first-class art work, much of it in colour.

EVERSHED & VIGNOLES, LIMITED, Acton Lane Works, Chiswick, London, W.4—October issue of Evershed News is presented in a new format, a larger format having been introduced to facilitate "a layout fully in keeping with modern design practice." Readers will appreciate the change. The issue contains several interesting technical articles, "The Automatic Control of the Concentration of Mixtures of Liquids," "The Metric Version of the Precise Tank Gauge," and "Accurate Measurement of Torque in Ballbearing" being among them.

NATIONAL COAL BOARD, Chancery House, Chancery Lane, London, W.C.2—Competing against the best of Britain's works' bands in the Daily Herald national brass band centenary championships, mining musicians gained two awards. The November issue of Coal Magazine includes an illustrated feature. Edwin Oakes contributes an article on the NCB's Hawthorn new unit—a multi-million pounds construction—which lifts coal from three older pits, cleans it, and carbonizes the coking coal. Back to music, there is a report and photographs of the recent Welsh Miners' Eisteddfod.

STANTON IRONWORKS COMPANY, LIMITED, near Nottingham—A glimpse of the cover picture of The Stantonian is always well worth the nominal penny charged for this attractive little magazine. The pastoral scene shown in colour on the front of the October issue is to be found in a quiet corner of the company's estate adjoining the Stanton Works. In the background can be seen the buildings of Furnace Pond Farm, Stanton-by-Dale, one of 27 farms owned by Stanton Ironworks. One of the many interesting articles outlines the history and activities of the Staveley Iron & Chemical Company, Limited (now in the Stewarts and Lloyds group), and its subsidiary company, the Sheepbridge Company, Limited.

LADLES FOR SWEDEN'S NEWEST STEELWORKS

LARGEST steel ladles ever made in Sweden, each weighing 34 tons and with a capacity of 180 tons of steel, have been delivered by Motala Verkstad to the new steelworks of the Grangesberg Company at Oxelösund, on the Baltic coast south of Stockholm. The delivery comprised three units. Too heavy for transport by rail or road, the ladles were delivered by barge, along the Gota Canal.

The ladles are intended for teeming steel tapped from an open-hearth furnace—the biggest of its kind in Sweden—into moulds, and the units have been designed with a view to making possible, with minor modifications, an increase in the steel capacity to 200 tons.

Further orders from Oxelösund for Motala Verkstad include 10 mobile 90-ton ladles, each weighing 23 tons plus 24 tons for the carriage, for the transportation of pig-iron from the blast furnace to the steelworks, and five 120-ton and three 100-ton ladles for transporting steel from mixer to furnace or converter.

THE RAIL and structural mill at Bhilai—the third of the four mills at Russian-built State steel plant—was inaugurated by Mr. Nehru on October 27.

AUSTRIAN STEEL OUTPUT
at Record Levels

AS a result of improvement in demand, Austrian production of steel reached new record levels last year, Dr. J. Oberegger reported in his presidential address to the recent meeting of the Eisenhütte Osterreich (Austrian Iron and Steel Institute).

A summary by the British Iron and Steel Federation of a report in Montan-Runoschau (Vienna), states that production of pig-iron increased by 10.2 per cent. to over 1,800,000 tons in 1959, and of crude steel by nearly 5 per cent. to 2,500,000 tons. Expansion of LD capacity enabled the output of LD steel to rise to nearly 1,300,000 tons—over half of Austria's total production. Open-hearth output declined by 4.5 per cent. last year, but electric-steel production increased by 9.7 per cent. Output of rolled products increased by 5.8 per cent. to over 1,700,000 tons.

Raw materials supplies were satisfactory on the whole. Scrap consumption amounted to 1,058,000 tons (1,021,000 tons in 1958), of which 736,000 tons (676,000 tons) was circulating scrap, 221,000 tons (227,000 tons) was bought on the home market, and 48,600 tons (66,000 tons) was imported, mainly from North Africa and the Middle East. Iron-ore production of 3,400,000 tons was at about the same level as in the previous year; to cover the industry's requirements, 660,000 tons of iron ore, 6,000 tons of manganese ore, and 336,000 tons of pyrites residue were imported.

Development Details

Developments in the Austrian industry were described by Dr. Oberegger. Alpine Montan will start up its new wire rod mill at Donawitz at the end of this year, and in 1961 will bring into operation a new strip mill at Donawitz, the special steel mill at Judenburg, and the special steel strip mill at Kindberg. A modern heat-treatment and pickling plant for stainless and acid-resisting strip is under construction at Kindberg. Last October, the company acquired the St. Andrä-Wördern steelworks, which had been closed down for 18 months, and is now producing some 6,000 tons of steel a month there in two open-hearth furnaces.

Vöest, at Linz, increased its output last year by having four blast furnaces in operation and by the starting up of its second LD melting shop. A 1,400-ton blast furnace is under construction, and in 1961 a second cold-reduction mill will be completed.

Gebr. Böhler completed a new bar mill at Kapfenberg last year, and is now installing new soaking pits and a vacuum casting plant. New installations at other works controlled by Böhler included a tube-welding plant at the Ybbstalwerke, and annealing and heat-treatment plant for precision tubes at the St. Egydyer works.

Schoeller-Bleckmann is starting production of seamless tubes this year, and is planning to install a 40-ton electric furnace, a slabbing mill, and a plant for the production of cold-rolled stainless steel strip up to 1,000 mm. wide.

Felten & Guilleaume has installed a new 50-ton open-hearth furnace, while a new blooming and billet mill should be completed this year.

Vogel & Noot has added a three-high stand to its plate mill.

New orders for ordinary rolled products increased to nearly 1,751,000 tons in 1959 (1,427,000 tons in 1958), and deliveries to 1,559,000 tons (1,434,000 tons). Orders on hand at the beginning of 1960 therefore totalled 551,000 tons (436,000 tons). Orders received from the home market rose by about a third to 900,000 tons, while deliveries were about the same at 742,000 tons, so that home orders on hand increased considerably to 313,000 tons. Export orders increased by nearly 100,000 tons to 835,000 tons, and exports to 818,000 tons (680,000 tons), representing over 50 per cent. of total deliveries, so that export orders on hand amounted to 238,000 tons. Over 52 per cent. of ordinary rolled steel exports went to ECSC countries, 17 per cent. to EFTA countries, 23 per cent. to the USSR and eastern Europe, 4 per cent. to other European countries, and only 3.3 per cent. to oversea countries. Home deliveries of special steel products declined by about 10 per cent. last year to 57,260 tons, while exports were about the same level at 111,000 tons, of which 41,000 tons went to ECSC countries, 19,000 tons to EFTA countries, 23,000 tons to the USSR and eastern Europe, and nearly 20,000 tons to oversea countries.

Export earnings of the Austrian iron and steel industry increased by 9 per cent. last year to some £58,000,000, representing over a sixth of Austria's total exports. At the same time, imports increased to £13,700,000. On the home market, steel prices had been unchanged since 1953, but they have been increased in two stages in the last year, on June 16, 1959, and January 1, 1960. Dr. Oberegger claimed, however, that Austrian home prices for ordinary rolled products were still lower than those in other major steel-producing countries.

In conclusion, Dr. Oberegger stressed the importance of the ECSC countries as a market for a large proportion of Austria's steel exports, and referred to the Austrian steel industry's unsuccessful attempts in recent years to reach some agreement with ECSC.

Dr. Oberegger hoped that within the foreseeable future it would be possible to find some suitable form of association between the EFTA and the ECSC.

Orders Placed

Gasholders for Scotland and Wales

TWO Wiggins dry seal type gasholders, which when built will be the largest of their type in the UK, are among recent orders obtained by P.G. Engineering, Limited, an associate company of the Power-Gas Corporation, Limited, and a member of the Davy-Ashmore group. The value of the orders is over £250,000. At the Clyde Iron Works of Colvilles, Limited, a Wiggins dry seal gasholder with a capacity of 1,000,000 cu. ft. is to be installed for the storage of coke-oven gas, and a similar capacity holder is to be installed for the Wales Gas Board at Rhondda.

For the Wales Gas Board also, P.G. Engineering has received a contract for a carburetted water gas plant with a capacity of 3,000,000 cu. ft. per day, to be installed at the board's Maelor Works, Wrexham. This plant incorporates a mechanical operator with boiler jacket, cyclic coke feed, and the reverse flow carburetting system.

AVO LIMITED, a company in the Metal Industries, Limited, group, is to supply 1,750 Radiac survey meter trainers to the Ministry of Aviation.

TRACTORS and other agricultural equipment worth £185,000 have been ordered from the Massey-Ferguson Company, Limited, by the Government of Guinea.

WORTH ABOUT £50,000, an order has been received by the Midland Heating & Ventilation Company, Limited, Birmingham, for the complete ventilation plant for the Hyde Park underpass.

CONTRACT, to the total value of £100,000, has been received from the Mexican State Railways by John Baker & Bessemer, Limited, manufacturers of railway wheels, steel tyres, and axles, of Kilnhurst (Yorks).

TWO EXPORT ORDERS for welded stainless steel tubing worth over £120,000 have been secured by Rollo-Hardy & Company, Limited, Blaenrhondda (Glam), a member of the Compoflex Company, Limited, group.

CLEVELAND BRIDGE & ENGINEERING COMPANY, LIMITED, Darlington, has secured a contract for the reconstruction of cross girders in the central spans of the river bridge between Sturton and Gainsborough, for British Railways.

FOLLOWING the recent order placed by the British Transport Commission with Stothert & Pitt, Limited, for 12 cranes for Grangemouth, the company has received another BTC order for 16 6-ton cranes and two 10-ton cranes for the port.

GREECE has placed an order with Perkins Engines, Limited, for 850 three- and four-cylinder agricultural diesel engines. They are for installation in 35-h.p. and 55-h.p. tractors, which will be known as Petropoulos P35 and Petropoulos P55.

REFINERY COLUMN, 90 ft. high and weighing over 70 tons, is being shipped from Liverpool to Mexico by W. J. Fraser & Company, Limited. It is part of an export order worth £100,000 and was built at the company's Barnsley works.

A £25,000 CABLE ANCHORAGE contract in connection with construction of the new Forth road bridge has been awarded to the Cementation Company, Limited. A total of 80 high-tensile steel cables, each stressed to a working load of 120 tons, is involved.

FORMAL RATIFICATION has now been effected of the contract, worth just under £1,000,000, obtained from Strojimport and Polytechna of Prague, Czechoslovakia, by the Vickers-H. J. Zimmer joint company, High Polymer & Petrochemical Engineering, Limited. The other joint company formed by Vickers and H. J. Zimmer, AG—is now also fully operative.

THE ADMIRALTY has ordered eight diesel shunting cranes from Thomas Smith & Sons (Rodley), Limited. Four will have a capacity of 5 tons, two of 6 tons, and two of 10 tons. The company is also to supply five of its "21" excavators to New Zealand, where there are already 160 Smith excavators in commission.

TWO EVAPORATORS, part of the continuous tinned steel strip plant which Head Wrightson Machine Company, Limited, is building for the Ebbw Vale works of Richard Thomas & Baldwins, Limited, have been ordered from the Kestner Evaporator & Engineering Company, Limited, London, S.W.1. They will be used for concentrating an acid electrolyte liquor.

GERMANIUM RECTIFIERS for the electrolytic production of chlorine have been ordered by the general chemicals division of Imperial Chemical Industries, Limited, from the heavy plant division of Associated Electrical Industries, Limited. It is understood that the order is the largest ever placed by the chemical industry in this country for semi-conductor rectifiers.

RECEIPT OF ANOTHER ORDER from Canada for an electrically driven walking dragline to be used for coal stripping, this time in the Maritime provinces, is announced by Ransomes & Rapier, Limited, Ipswich, a subsidiary of Newton, Chambers & Company, Limited. Worth $1,500,000, the order has been placed by D. W. & R. A. Mills, coal contractors, of Minto, New Brunswick.

TRANSFORMER DIVISION of Associated Electrical Industries, Limited, is to build two 340-mVA generator transformers for the Central Electricity Generating Board, the largest so far scheduled by the CEGB. They will be installed at West Thurrock power station where they will be connected to two AEI 300-mW turbine-generator units for supply to the 275-kV supergrid. The order is worth about £400,000.

AN ORDER for further carbonizing and ancillary plant at the Osborne Works of the South Australian Gas Company has been received by Woodall-Duckham (Australasia) Pty., Limited. The order, which is valued at approximately £A200,000, includes the extension of the existing bench by the addition of a further 10 3¼-ton intermittent vertical chambers, a second waste heat boiler, extensions to the chamber house with the provision of an elecric lift, and a gas washer and gas condenser each of 3,000,000 cu. ft. per day capacity.

ONE IN THREE BRITISH VALVES EXPORTED

EFFORT by small companies manufacturing valves to export at least one quarter of their output is urged by Mr. F. Burgess, chairman of the British Valve Manufacturers' Association in his annual report. He said that valve exports were now running at an annual rate of £14,000,000—over one third of the annual output of valves in the UK went abroad. The association had embarked on a long-term study on oversea sales promotion and was ready to assist members in planning export campaigns.

This year the BVMA "came of age" and its membership now numbers 69 companies manufacturing steel, iron, and non-ferrous valves. Mr. Burgess, (Whites-Nunan, Limited) was re-elected chairman for the year 1960-61, and Mr. K. M. Leach (Audley Engineering Company, Limited), was re-elected vice-chairman. Mr. B. S. Bass (Dewrance & Company, Limited), has joined the executive committee.

Winds of Change

INDICATED BY EUROPE'S STEEL EXPORTS

BAROMETER for the steel industry, in western Europe at least, is provided by steel exports. In the last two years, states the Secretariat of the UN Economic Commission for Europe in a review of the European steel market, steel exports showed the first signs of the weakening market in 1958, and were again the first to indicate the up-swing last year. As, however, restored steel demand is based, in the main, on home markets, decline in exports to be expected this year should not have a retarding influence.

The events in the last two years, the review states, have shown a particular sensitiveness of steel demand to psychological factors. Therefore, increased attention should be paid to stockpiling by steel consumers. It is evident that normal cyclical stock movements cannot be avoided. However, in all cases of abnormally high stocks held by consumers a sudden and precipitated destocking must be expected and this leads to a distortion of the supply and demand mechanism on the market.

In spite of the evidence of high business activity in the foreign markets, the extraordinary up-swing in the steel industry last year was based on the respective home markets. In the case of the ECSC countries new orders from the home markets increased last year from 23,900,000 tons to 31,200,000 tons—31 per cent.

ECSC Exports Down

The decline in exports expected this year is supported by a statement by the High Authority of the European Coal and Steel Community. September sales of rolled steel products to non-ECSC countries were as much as 32 per cent. below the average monthly level of 1959 and, with the exception of Holland, every ECSC member is reported to be experiencing a falling-off in export orders from non-Community countries.

Pig-iron production in Europe in 1959 rose above the 12.000.000-ton mark, an increase of 7 per cent. over the previous year. In the Community countries the increase amounted to 7.4 per cent. and in eastern Europe to 9 per cent.

European crude steel production rose by 14.000,000 tons (9 per cent.) last year to 172.000.000 tons. In eastern Europe output was up by 7.000.000 tons to 79.300.000 tons. During 1959 world-trade in semi-finished and finished steel products reached a new record level of 32,200.000 tons—1.500.000 tons or 4.8 per cent. higher than in the previous best year, 1957. Most of this increase originated from western European countries which together accounted for 75 per cent. of world steel exports. Poland, Czechoslovakia and the USSR accounted for almost 13 per cent. of world exports.

At the recently concluded session of the ECE Committee on the Development of Trade it was unanimously decided to convene a group of governmental trade experts which will seek to eliminate trade difficulties and work out solutions to problems in order to facilitate sustained trade expansion. This meeting is expected to take place early next year.

It was also agreed to recommend governments to examine the possibility of extending or further expanding the transferability of balances arising in international payments relations.

The committee also considered the views of governments on long-term trade agreements, inter-regional trade, arbitration, insurance problems, the protection of patents and technical inventions, trade fairs and technical shows, the standardization of general conditions of sale, problems of trade in machinery and equipment, and trade in consumers' goods.

Russian Report on Ceylon Steelworks

REPORT by Soviet experts on a proposed iron and steelworks in Ceylon has been delivered. It is understood that the project would cost Rs. 150.000.000 (£11.250,000), of which 65 per cent. would be provided by Russia under a technical and economic co-operation agreement.

The first stage of the project would be the setting up of a rolling mill with a capacity of 35.000 tons a year. Initially, this would rely on imported blooms until the blast-furnace shop—the second stage—could provide it with liquid pig-iron. Provision is made for the training of 58 Sinhalese in specialized techniques in Russia, while semi-skilled personnel would be trained on the spot by Russian specialists.

Last year Ceylon imported about 60,000 tons of iron and steel and products.

Third AEI Generator Commissioned at Kariba

THIRD of the six 100 mW generators to be supplied by Associated Electrical Industries, Limited, to the hydro-electric station at Kariba was recently commissioned under the supervision of Merz & McLellan, consulting electrical and mechanical engineers, of London, S.W.1. AEI switchgear division has already commissioned the 330 kV switching station at Kariba and also the 330 kV substations at Kitwe, Lusaka, Norton, and Salisbury.

The second generator went into commission in May when the Queen Mother opened the Kariba Power Scheme. The first generator was commissioned in December 1959.

Law Cases

NCB Wins Appeal in Scottish Court

AWARD of £4,000 made by a jury on February 19 to Mr. Richard Stein (25), assistant machineman, against his employers, the National Coal Board, was unanimously set aside by the First Division of the Court of Session. Mr. Stein, who had sued the NCB for £6,000, had stated that in August, 1956, he was crossing a conveyor belt in Moat Colliery, Roslin (Midlothian), when it suddenly started to move. His left hand was drawn into the mechanism and his arm had to be amputated.

The Coal Board, which had denied liability, appealed against the award on the grounds that the verdict was contrary to the evidence.

The Lord President (Lord Clyde), giving judgment, said that in the utterly confusing and contradictory state of the evidence on the basic issue of Mr. Stein's case—that the belt started moving as he stepped on to it—he did not understand how any reasonable jury could arrive at a conclusion favourable to the plaintiff. It might be that because of the long interval between the accident and the raising of the action the witnesses' recollections became confused; or it might be that in their anxiety to avoid blaming themselves or their mates for the illegal operation of the conveyor switches, their evidence came out in obscurity and contradiction.

The result was that on the evidence as disclosed at the trial no reasonable jury could have held the plaintiff's case proved. Lords Carmont, Sorn, and Guthrie concurred and, in the absence of an offer by Mr. Stein to produce any fresh evidence to justify a retrial, entered a verdict for the Coal Board.

BREACH OF SAFETY REGULATIONS

STERLING METALS, LIMITED, Nuneaton, was fined £50 with £11 17s. costs at Nuneaton for a breach of the electricity safety regulations under the Factories Act. The case arose out of an accident when an employee of a contracting firm came into contact with a live trailing wire when fixing an overhead runway for a conveyor.

The company submitted that it was the contractors' responsibility to see that the power was switched off before work started. For the contractors Mr. J. C. Stevenson said it was arranged that the work should be done after normal working hours when the overhead crane would not be working. It was primarily the responsibility of Sterling Metals to see that the electricity was switched off.

MINER'S FOLLY

"IN face of the disasters which we have had in the district, I can't understand why men should risk their lives and the lives of others by doing this sort of thing," said Mrs. E. M. Bevan, chairman of Abercarn Bench, in fining William H. Roberts £4 for having contraband below ground.

Prosecuting for the NCB, Col. K. Treasure said that during a search at the Graig Fawr Colliery, Roberts was found to be holding a tin in which there were two cigarettes and two matches.

PLAINTIFF GUILTY OF NEGLIGENCE

GIVING judgment in a claim for damages by Mr. Arthur Edward Barklam (61) against his employers, Thompson Bros. (Bilston), Limited, makers of chemical and galvanizing plant, etc., Judge E. G. H. Beresford at Wolverhampton County Court said the plaintiff was guilty of considerable negligence.

Mr. Barklam climbed 40 ft. above the workshop floor to take over a 30-ton overhead crane. He was involved in an accident with the crane. The judge said: "I have no doubt that when he attempted to enter the crane he thought it was safe to do so, but was he justified in that assumption?"

Mr. Barklam was awarded £178 damages and agreed special damages of £72.

INSECURELY FENCED MACHINERY

FINES totalling £150 were imposed by Sheffield Magistrates on Mark Tyzack & Sons, Limited, aircraft sheet metal workers, for offences of having insecurely fenced machinery. The company pleaded Guilty. It was stated that an operator had been injured when using a 30-ton press. When a factories inspector visited the works he was surprised to find that another machine was also being used without guards.

For the company, Mr. J. Beal said that strict instructions had been given to employees not to use unguarded presses. The firm had ordered new guards for some machines which were standing idle until these arrived.

FIRM'S EFFORTS FOR SAFETY

FOR failing to fence securely a power press, Hills (West Bromwich), Limited, was fined £50 at West Bromwich Stipendiary Court. For the company, Mr. N. Duffel, said the firm had had great difficulty in fencing the particular machine because of changing design of the tools.

It had since devised a suitable guard. A new safety officer had been appointed and the company was making determined efforts to avoid a repetition of the accident which led to the case.

FORMER WAGES CLERK at Shireoaks Colliery (Yorks), Bertram Clifton (40), was sent to prison for two years at the adjourned Nottinghamshire Quarter Sessions. He pleaded Guilty to 18 charges of falsification of accounts and stealing money and asked for 420 outstanding charges to be taken into account.

FORMER CARETAKER of the NCB offices at Ednam House, Dudley, Horace James Page (37), was fined a total of £25 at Dudley magistrates' court for stealing £7 2s. 6d. from the offices. He asked for eight similar offences to be taken into consideration. Page was identified as the thief after decoy notes, which had been covered with a fluorescent powder, were discovered in his possession.

West Nottinghamshire Technical College

FORMAL opening of the new West Nottinghamshire Technical College, which has now assumed the place previously held by Mansfield Technical College, founded some 32 years ago, took place on Tuesday.

Performing the opening ceremony, Mr. Alfred Robens, chairman-designate of the National Coal Board, said that the coal industry had a vital interest in the development of technical education. It was required by statute to appoint only technically qualified men to all the key appointments at a mine, and it had long depended, and would continue to depend, on the technical colleges to train those men.

In Parliament

PROSPECTS FOR NCB

Minister Condemns Labour Jeremiahs

IMPASSIONED appeal for the coal-mining industry was made by MR. HAROLD FINCH (Lab.) during the course of the debate on public investment in the House last week. "To what extent is the industry to be cut back? Where is the cut to stop? Is there to be no limit set on the consumption of oil. Is it to go on and on at the expense of the country's economy?" he asked. Men were leaving the coalfields at a fantastic rate and there had been a serious increase in the average age of those remaining.

It was not the fault of the Coal Board or the men, he maintained. Over the last three years operational costs had been reduced by £50,000,000 and output per manshift increased by 10 per cent. He appealed to the Minister of Power to give the industry some confidence so that it could save the country's economy in the years ahead.

After further debate MR. GERALD NABARRO (Con.) had his turn. In addition to £64,000,000 losses forwarded by the NCB at June 30, there was £140,000,000 tied up in coal and coke stocks. The proper figure should be £40,000,000. There was, therefore, £164,000,000 totally sterilized. He believed the Minister would have to come to the House shortly before or after Christmas and ask for more money for the NCB. "He will get a very hostile reception from me and many of my friends," he promised.

No Hampering of Coal Board

Replying, the MINISTER OF POWER, Mr. Richard Wood, said the total programmes of the nationalized fuel and power industries for next year showed a slight increase over the probable out-turn for this year, largely because the increased requirements for electricity outweighed the reductions for coal and gas.

The peak of the NCB's capital investment programme had now been reached and a reduction in its annual investment budget was now beginning. "There is no question of the NCB being hampered in obtaining capital which it needs," he said. "There has been no cut suggested by the Government in the White Paper."

He went on to take Mr. Finch "and one or two of his friends" to task for presenting a picture which was hardly likely to inspire confidence in the coal-mining industry. Demand for coal had fallen to 195,000,000 tons last year, but this year it was likely to be something over 200,000,000 tons, he said. Manpower was certainly causing anxiety, but recruitment showed considerable improvement. It was not likely to go on doing so if members were determined to describe the prospects for the industry in terms which the facts at present, with increased demand this year, did nothing to justify.

He now understood the demand for a national fuel policy to mean that the industry should have some protection from oil. The difficulty was that coal did not run either motor cars or aeroplanes, tractors or combines. Oil was absolutely essential to our economy and it would be wasteful to make less than the fullest use of all the products which the refineries produced. If there were neither imports nor exports of fuel oil the competition which oil would offer to coal would be even stronger than it was at present.

He countered the criticism of the loss the NCB had to sustain on importing coal by remarking that no account was taken of the earnings at the same time from exports of coal—on balance greater than the losses, and he added that he also failed to understand why the NCB should not accept the obligation for mining subsidence—it was one of the new obligations which any modern industry should accept.

The decision to stock coal and so prevent considerable unemployment was an obligation placed upon the board by the Coal Industry Act. "The National Coal Board was right to take that decision in order to safeguard the welfare of those it employs."

Engineering the Cinderella of the Universities

ADMITTING Lord Shackleton's criticism of the shortage of scientists both in private industry and in research institutions, LORD HAILSHAM, Minister for Science, told the House of Lords that it would be wrong to look for rapid results. It took 25 years to produce a good scientist and decisive results followed after another 10 years of useful work.

In 1958 the universities produced just over 2,000 engineering graduates. Another 4,000 qualified in other ways. In the US and Russia the figures were much higher in proportion, even allowing for the larger populations. The problem would not be solved unless it was recognized that the field of advanced technological training ought to attract, as it did abroad, a due proportion of the best intellects. Engineering should enjoy a far higher status in the universities.

The DSIR report on the machine-tool industry brought to light the fact that the educational pattern of the production of engineers in the universities and colleges of technology was not particularly helpful or suitable to the industry. New courses were likely to be available.

SMOKELESS SOLID FUELS

FIRST trickle of the flood of questions on supplies of smokeless fuels came on Monday when MR. JOHN C. GEORGE, Parliamentary Secretary to the

Ministry of Power, told Mr. Will Owen (Lab. and Co-op.) that although there was always the possibility of local shortages of particular fuels no serious shortages were expected. Stocks were about the same as last year and coke supplies were particularly abundant.

Some retail merchants did not share Mr. George's optimism, said MR. OWEN. In some areas there were less than two weeks' supply in the stockyards. Was there a bottleneck in supplies or was transport the problem?

Railway and other difficulties might crop up, but there were ample stocks in the country to meet the demands likely to be encountered this winter, MR. GEORGE maintained.

COLLIER WHO HAS NOT WORKED

CASE of the colliery pithead gear attendant who has not worked for three and a half years because he got £10 18s. in social service payments, and three pints of milk a day free, was raised by MR. CYRIL OSBORNE (Con.). He asked the Minister of Pensions, Mr. John Boyd-Carpenter, if he would amend the regulations to prevent such abuses of the social services.

Replying, the MINISTER said the amount quoted included £2 18s. family allowances, paid in respect of seven children, which were payable whether the father worked or not. He understood National Assistance payments had now ceased, and the question of the man's availability for work was now before the authorities. The case, which had some very special features, did not disclose any defect in the statutory provisions.

MACHINERY FOR JAPAN

ASKED by MR. GRESHAM COOKE (Con.) what steps were being taken to improve exports of machinery and machine tools to Hongkong and Japan, MR. REGINALD MAUDLING, President of the Board of Trade, said exports of machinery to Japan had increased this year and this country was still the principal supplier of machinery to Hongkong.

There was scope for increased exports, however, to both markets and he had drawn the attention of the industries concerned to the increased opportunities afforded by the further liberalization of Japanese machinery imports.

MR. WILL OWEN (Lab. and Co-op.) was told by the Economic Secretary to the Treasury that no loans at low interest rates would be made to the National Coal Board and in any case reducing interest rates would not make a substantial difference to coal prices.

IN A WRITTEN REPLY to Mr. Richard Kelley (Lab.) the Minister of Labour said that in No. 2 Area, North-Eastern Divisional Coal Board on November 5 there were vacancies for 1,194 workers in coal mining. Shortages of some types of labour had persisted for some time and everything possible was being done to fill the vacancies locally.

A BILL to extend from three months to six months the period of grace allowed to renew a patent or copyright protection for a design gained a second reading in the House of Lords on Tuesday. Lord Dundee, Minister without Portfolio, explained that the Bill—the Patents and Designs (Renewals Extensions and Fees) Bill—would bring the UK into line with international practice and make a number of improvements in the existing patents law.

Council to Boost UK Trade in Europe

FULL membership and aims of the new Export Council for Europe have been announced. One of the Government's positive aids to exporters, it will be organized on the same lines as the Dollar Export Council, and support and extend the opportunities in Europe for the export of British goods, keeping companies in this country fully informed on European markets and potential markets. Working in co-operation with existing organizations and Government departments it will give direct help to exporters and would-be exporters.

As already announced, the council will be under the chairmanship of Sir William McFadzean, president of the Federation of British Industries, and chairman and managing director of British Insulated Callender's Cables, Limited. The representatives on the council of the various sponsoring bodies include Sir James Hutchison, president of the Association of British Chambers of Commerce, and chairman of Grampian Holdings, Limited. Sir Norman Kipping, director-general of the Federation of British Industries, and Mr. Morton Oliphant, president of the National Union of Manufacturers.

The individual members of the council, who will serve in their personal capacities, include:—Mr. A. J. S. Brown, a director of Stone-Platt Industries, Limited, Mr. A. M. Browne, chairman and managing director of Hackbridge & Hewittic Electric Company, Limited, and vice-chairman of the British Electrical and Allied Manufacturers' Association, Dr. A. Caress, a director of Imperial Chemical Industries, Limited, Sir Joseph Lockwood, chairman of Electrical & Musical Industries, Limited, Mr. Hector McNeil, managing director of Babcock & Wilcox, Limited, Mr. J. Hugh Neill, deputy chairman and joint managing director of James Neill & Company (Sheffield), Limited.

Mr. O. F. Reichwald, managing director of Daniel Adamson & Company, Limited, Mr. E. W. Senior, commercial director of the British Iron and Steel Federation, Mr. J. C. Snow, director of Snow & Company, Limited, and president-elect of the Machine Tool Trades Association, Mr. P. F. D. Tennant, oversea director of the Federation of British Industries, and Mr. R. W. Weekes, managing director of the Harland Engineering Company, Limited.

New Metallurgical Process for Steels

IN association with Foundry Services International, Limited, the Inca Steel Company, Limited, Sheffield, is developing a process for the casting of ingots and other items arising from an invention of Mr. W. Kelsey, a director of Inca Steel. It is stated that the process results in ingots having a homogenous structure which is particularly applicable to the high speed steels in that central carbide segregation is eliminated.

At the moment development work on the process is still continuing, but it is intended ultimately to make the technique available to steel manufacturers in the UK and throughout the world by the companies within the Foseco Group.

THE COAL TRADE

BOTH industrial and household demand for solid fuel appears to have settled down and although trade is brisk, merchants, by and large, are managing to cope. The principal difficulty in some areas such as the Midlands is in getting sufficient supplies, particularly of the better qualities. Alternatives have to be offered where pressure for immediate delivery is acute, but no one likes to debase what could be a good-class trade.

LEICESTERSHIRE

Considerable improvement in the supply of house coal for domestic purposes is reported from distributors at most depots, and tonnages of some grades have been offered outside contract arrangements. There is still a lively demand from that section of the public which relies on small deliveries, and grades normally taken by this class of consumer are now more plentiful.

There is little change to report in the position of anthracite, both of stove and stovesse nuts and those qualities normally supplied under the Small Anthracite Supply Scheme. The better grades are exceedingly scarce and although some consumers are now accepting lower grades, they do so with some reluctance. The supply of "Rexco" and "Coalite" has also improved and there is prompt despatch of "Cleanglow" and "Warmco." The tonnages of locally produced smokeless fuels are increasing weekly and a good market is now available. Other grades of anthracite, including the larger sizes normally used for horticultural purposes, are in better demand.

There is a firm demand for all classes of coke for the central heating market, but adequate quantities are available and no difficulties are being experienced.

Supplies for the industrial coal market, although available under programme, are often difficult to obtain and apprehension is still felt about the position of doubles, D.S. nuts, and singles. An improvement in the supply position is looked for both in dry cleaned and washed qualities.

West Midlands' Drift from the Pits Slows Down

RATE at which men have been leaving the pits in the West Midlands Division of the National Coal Board has slowed down in recent weeks. On October 29, manpower in the division was 43,264—7,226 less than at the same time in 1959 and 6,424 less than at the beginning of this year. Output per manshift in the four weeks ended October 29, was 92.42 cwt. at the face and 28.56 cwt. overall.

Total output in the division during the four week period was 1,129,000 tons, which was 10 per cent. down on the corresponding weeks of 1959. So far this year output has reached 11,803,000 tons, a decrease of 1,404,000 tons or nearly 11 per cent. on 1959. Stocks of all types of coal in the division fell by 242,000 tons to 2,451,000 tons during the period.

THE MINISTER OF POWER was in constant consultation with the heads of the fuel and power industries on their future policy and on all major issues of national fuel policy and did not consider any additional guidance necessary—Parliamentary Secretary to the Ministry of Power in a written reply to Mr. Albert Roberts (Lab.).

Shorter Working Week in the Mines

A NEW working week for miners will be introduced from January 1 if the district associations adopt a recommendation of the NUM executive.

The miners' leaders decided on Wednesday to recommend acceptance of an offer by the National Coal Board to reduce working hours by 15 minutes a day on the understanding that there will be no general compensatory increase for those on piece rates. If the management and men at any pit agree that pieceworkers' earnings have fallen unavoidably because of the reduction in hours, claims for revised rates will be considered. If pieceworkers' earnings fall, but there is disagreement on the cause, the question will be referred to an umpire.

If the agreement is accepted, surface workers will be paid their present wages for 41¼ hours a week, excluding mealtimes; those underground will have five shifts, each of 7¼ hours and one winding time.

Future for Coal Gasification

SUCCESS in developing improved methods of gasifying coal, in addition to its effect on the future energy economy of the UK, could be a most valuable addition to our engineering exports, on which the financial stability of the country was increasingly dependent. This conclusion was reached in a paper—"The Choice of Subjects for Research and Development"—presented by Sir Harold Hartley at the 26th autumn research meeting of the Institution of Gas Engineers in London on Tuesday.

Sir Harold, who is scientific adviser to Constructors John Brown, Limited, said the competitive power of gas in the future would depend mainly on the ability of the industry to sell it at a lower price. At the average pithead price of coal, one therm cost 3¼d.; at £10 a ton, 8½d. With fuel oil at £10 a ton it cost 6d.; with paraffin at £20 a ton, it cost 11d., whereas with gas at the average price it cost 1s. 9d. and at the average price to industry 1s. 3½d.

ROBERT HUDSON, LIMITED, light railway equipment manufacturers, etc., of Leeds—Disappointing trading profits at home for the year to June 30, 1960, are attributed by the chairman (Mr. K. Hudson) to the fall off in demand from the mining industries, poorer prices for capital goods, and intense competition with consequent lower margins. Sufficient orders were, however, obtained to maintain a volume of work comparable with last year. There are at present indications of a greater volume of inquiry which it is hoped will lead to more favourable business.

Coalfield News

Pithead Baths: Yorkshire Nears 100 Per Cent.

SPEAKING at the opening of new pithead baths, offices, and a canteen at Newmillerdam Colliery, Wakefield (Yorks), last Friday, Mr. Sam Bullough, president of the Yorkshire Area of the National Union of Mineworkers, said that the Yorkshire coalfield was now nearing the 100 per cent. mark in the provision of pithead bath facilities.

The opening ceremony was performed by Mrs. Atkinson, wife of Mr. H. Atkinson, general manager of No. 6 (Wakefield) Area, North-Eastern Divisional Coal Board.

APPRENTICES from the Hardwick, Grassmoor, and Avenue plants of the East Midlands Divisional Coal Board's carbonization department were presented with apprenticeship certificates on Thursday of last week by the carbonization general manager, Dr. N. M. Potter.

SPORTS STADIUM is to be built at a cost of £100,000 on the cricket ground at Snibstone Colliery (Leics), by the Coal Industry Social Welfare Organization. Expected to be one of the best equipped in the country, it will have facilities for football, cricket, and indoor activities, and there are plans to lay a running track of international standard later.

SHIPMENTS of coal and coke from the Tyne in October, at 613,528 tons, were the best for any month since January, 1958. They compared with 247,187 tons in September and 480,952 tons in October, 1959. In the first 10 months of the year 4,517,367 tons were shipped from the river, compared with 4,673,265 tons in the corresponding period last year.

THREE OF THE NINE collieries in No. 3 Area (South-East Durham) of the Durham Divisional Coal Board passed their targets last week. The total output of 96,235 tons exceeded the combined target by 2,335 tons. A 7,000-ton increase in the coal won at Dawdon Colliery in No. 2 (Mid-East Durham) Area last week was largely responsible for the sharp rise in the Area's production figure.

MAIN STUMBLING BLOCK to the clean air movement in mining areas was the burning of raw coal. It should not be beyond the NCB and the trade unions to come to some agreement on the use of smokeless concessionary fuel, said Mr. J. Collins, chairman of Blackwell (Derby) Rural Council's health committee, presenting a report on the annual conference of the National Society for Clean Air last week.

COAL AND COKE SHIPMENTS from the South Wales ports last week totalled 53,541 tons, 10,752 tons more than the previous week's total, but 2,043 tons less than that of the corresponding week of 1959. Shipments from the various ports (in tons) are as follow (1959 tonnages in parentheses):—Newport, 8,939 (13,511); Cardiff, 10,012 (7,438); Penarth, 2,295 (3,541); Barry, 9,951 (5,862); Port Talbot, 162 (—); Swansea, 22,182 (25,232).

FORMER MINER, Mr. J. Cooper who stated in court that he had not worked since 1957 as he drew more money from unemployment benefit, etc., had his National Assistance allowance cut last week because he "worked" by appearing on television and his unemployment benefit cut because he appeared in court on Saturday and was not, therefore, available for work. He has now taken a job with the Derbyshire Coalite Company, Limited, chipping carbon from the inside of coal hoppers.

Coal Consumption Up By Nearly 7,500,000

TOTAL consumption of coal so far this year has risen by 7,496,000 tons to 168,251,000 tons. The main increases came in the electricity, coke oven, and domestic sectors of the market, with a slight increase in the iron and steel trade. By far the biggest percentage increase has been in the export trade which has risen to 4,701,000 tons from the 1959 figure of 3,475,000 tons. Undistributed stocks of coal in the week ended November 12 amounted to 32,524,000 tons, compared with 35,726,000 tons in the same week of 1959.

There were 585,500 wage-earners on colliery books on November 5, against 639,300 on November 7, 1959, the numbers engaged at the coal face being 221,300 and 246,800 respectively. Total absenteeism (all workers) in the week ended November 5 was 14.65 per cent., compared with 14.20 per cent. in the week ended November 7, 1959. Output at the face was 4.040 tons and overall 1.418 in the week ended November 5, compared with 3.854 and 1.379 tons in the week ended November 7.

The following table gives (in tons) the output of saleable mined coal by division in the week ended November 12, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

Division.	Week ended November 12, 1960.		Week ended November 14, 1959.
	Total output.	Tonnage lost.	Total output.
Scottish	350,700	8,800	387,500
Northern (N&C) ..	244,600	700	255,800
Durham	469,100	—	481,800
North-Eastern ..	855,100	27,700	837,900
North-Western ..	241,100	14,600	281,900
East Midlands ..	907,400	500	910,500
West Midlands ..	277,200	300	312,300
South-Western ..	391,000	4,800	415,800
South-Eastern ..	30,700	200	34,200
Great Britain—			
Deep-mined coal ..	3,766,900	57,600	3,917,700
Other deep-mined (including licensed mines) ..	40,600	—	59,500
Open-cast coal ..	157,100	—	167,600
TOTAL	3,964,600	57,600	4,144,800

Oil Will Warm Miners at Coalville Clubs

THE two biggest working men's clubs in Coalville (Leics)—three-quarters of whose members are miners—have scrapped their solid fuel boilers and changed to oil-fired central heating. A few days ago a protest was made by a local county councillor, and endorsed by Mr. Frank Smith, local secretary of the NUM, over the heating of a new grammar school in the area by oil. Mr. Smith said on Monday that at that time he did not know that the clubs had changed over to oil. "It is deplorable. The matter will be raised at the miner's council meeting next Monday."

The secretary of one of the clubs, Mr. Ernest Wright, a mineworker at Desford Colliery, said that there were miners on the club committee and there had been no complaints. "We used to burn coke and there are several reasons why we would not wish to go back to it," he said. The steward of the other club said that there had been no complaints about the change.

COMPANY NEWS

SHEFFIELD TWIST DRILL & STEEL COMPANY, LIMITED—Interim ordinary dividend is raised to 8¼ (6¼) per cent.

MINERALS SEPARATION, LIMITED—Interim dividend for 1960 is maintained at 4d. per 5s. share on a capital increased to £2,500,000 by a one-for-four-rights issue.

DUNSWART IRON & STEEL WORKS, LIMITED, South Africa—Final dividend of 14 per cent. makes 20 (nil) per cent. Net profit was £202,065, compared with the previous year's loss of £15,869.

GEORGE TURTON PLATTS & COMPANY, LIMITED—Final dividend of 15 per cent. makes 25 (20) per cent. for the year ended July 31, 1960. Net profit was £63,670 (£54,654), after tax of £52,194 (£22,755).

JOHN HUDSON FUEL & SHIPPING, LIMITED—Interim dividends are resumed with a 3 per cent. declaration on account of the year ending March 31, 1961. For 1959-60 there was a single payment of 7 per cent.

ELLIOTT-AUTOMATION, LIMITED—An interim of 5 per cent. has been declared on capital increased by one-for-five rights and scrip issues and by the issue against the acquisition of the Rheostatic Company, Limited.

MOSS GEAR COMPANY, LIMITED—Unchanged final dividend of 13¼ per cent. makes 18 (17¼ equivalent) per cent. for the year ended August 31, 1960. Net profits were £140,930 (£235,566), after tax of £133,717 (£233,636).

COVENTRY MACHINE TOOL WORKS, LIMITED—The offer for the capital made by Wickman, Limited, has been accepted by the holders of 93.1 per cent. of the share capital and the offer has therefore been declared unconditional.

ARUNDEL COULTHARD & COMPANY, LIMITED, textile machinery makers, etc., of Stockport—Dividend of 10 (5) per cent. is to paid for the year ended June 30, 1960. Net profit was £87,597 (£30,570), after tax of £83,995 (£37,022).

LAMBERT BROS., LIMITED, coal exporters, etc., of Cardiff—Interim dividend is raised to 7½ (5) per cent. The increase is designed to reduce the disparity between payments and should not be taken to imply an increased total dividend.

SPEAR & JACKSON, LIMITED, tool makers, etc., of Sheffield—Conditional agreement has been signed with respect to an offer to be made to purchase the share capital of Brades & Nash Tyzack Industries, Limited, in exchange for ordinary shares.

CHARLES WINN & COMPANY, LIMITED, manufacturers of valves, fire appliances, etc., of Birmingham—Final dividend of 5 per cent. makes 7½ (5) per cent. for the year ended July 31, 1960. Net profit was £25,789 (loss £17,413), after tax of £9,681 (£400).

PLESSEY COMPANY, LIMITED, manufacturing electrical engineers and instrument makers, of Ilford (Essex)—Net profit for the year ended June 30, 1960, was £1.907,850 (£1,077.029), after tax of £2,393.034 (£1,159 090). Final dividend of 8½ per cent. makes 15½ (13) per cent.

AURORA GEAR & ENGINEERING COMPANY, LIMITED—Group profit was £34,396 (£22,220), after tax of £25,118 (£20,470). To find finance as part consideration for another acquisition and to provide additional permanent capital, a one-for-two rights issue is to be made at 2s. 6d. a share.

DESOUTTER BROS. (HOLDINGS), LIMITED—Formation is announced of a new subsidiary—Carter Stevens (Automation) Limited—to carry on the businesses of Carter Stevens & Company (Engineering), Carter Stevens & Company (Automation), and Blakeman Designs, all of Coventry.

JOSEPH LUCAS (INDUSTRIES), LIMITED—Final dividend of 2s. 3d. makes 2s. 9d. (2s. 6d.) per £1 ordinary share for the year ended July 31, 1960. The total is equivalent to an increase of 1¼ per cent. to 13¼ per cent. Net profit was £2,923,424 (£2,527,437), after tax of £5,149,390 (£5,142,728).

METAL CLOSURES, LIMITED—A joint statement issued by the board and the directors of F. Francis & Sons (Holdings), Limited, states that merger discussions have been discontinued. Detailed investigations had revealed that the merger would not have been as advantageous as was hoped.

JOHN HOLROYD & COMPANY, LIMITED, gear manufacturers, bronze founders, etc., of Rochdale—A final dividend of 10 per cent. makes 15 per cent. for the year to September 30, 1960, against the previous year's single payment of 10 per cent. Group profit increased from £347,542 to £419,462.

WESTON-EVANS & COMPANY, LIMITED, engineers to to the textile industry, of Clifton, near Manchester—A one-for-four scrip issue is proposed. The interim dividend is 10 per cent. on the increased capital and the directors hope to recommend a 15 per cent. final for the year ending March 31, 1961.

CARRIER ENGINEERING COMPANY, LIMITED—The company is maintaining its 50 per cent. total on the £500,000 ordinary with a 30 per cent. final dividend for the year to June 30, 1960. A one-for-one scrip issue is proposed. Group profit rose to £836,662 from £765,637 before tax of £396,079 (£326,810).

BROOM & WADE, LIMITED, makers of air compressors, pneumatic tools, etc., of High Wycombe (Bucks)—The dividend is effectively raised by 7½ per cent. to 22½ per cent. with a final of 17½ per cent. Group profits, before tax, expanded to £1,044,922 (£851,858) and the net profit is £497,314, compared with £435,923.

YORKSHIRE COPPER WORKS (HOLDINGS), LIMITED—Final dividend of 7½ per cent. makes 12½ (10) per cent. for the year to July 31, 1960, in addition to which a special 50th anniversary bonus of 2½ per cent. is to be paid. Profits increased from £2,233,082 to £2,624,960, before tax of £1,371,167 (£1,296,239).

BELL'S ASBESTOS & ENGINEERING (HOLDINGS), LIMITED—The rights issue of 1,161,000 ordinary shares has been taken up by the holders of 1,140,600 shares. The balance of 20,400 shares will be allotted to "excess" applicants on the basis of full allotment for applications of up to 33 shares and 34 shares for applications of over 33 shares.

CONCENTRIC MANUFACTURING COMPANY, LIMITED, manufacturers of precision brass fittings and automobile units, of Birmingham. Final dividend of 30 per cent. makes 40 (35) per cent. on an increased capital for the year ended October 1, 1960. A one-for-five rights issue is announced at 10s. per 2s. share. Group net profit was £253,991 (£215,138), after tax of £177,355 (£182,154).

STANHAY (ASHFORD), LIMITED, agricultural, general, and precision engineers, of Ashford (Kent)—In view of the difficulties which the motor and agricultural industries are experiencing at the present time the directors consider it prudent to reduce the interim dividend to 4 (5) per cent. for 1960, but the position

will be reviewed when accounts for the full year are available.

SIMMS MOTOR & ELECTRONICS CORPORATION, LIMITED—One-for-10 scrip issue—involving the capitalization of £260,583—is to be made. Due to continued expansion the capital now employed shows a further excess over the issued capital in addition to which the issue of ordinary shares at a premium last July had the effect of adding some £434,000 to share premium account.

ANDERSON BOYES & COMPANY, LIMITED, makers of coal-cutting machines, power loaders, etc., of Motherwell—Underwriting is in progress of an offer for the sale of 910,000 £1 ordinary shares at 29s. a share. The offer for sale will be published on Monday and application for quotation for the issued capital of £3,343,392 will be made to the London and Glasgow stock exchanges.

STEEL BARREL, SCAMMELLS & ASSOCIATED ENGINEERS, LIMITED—Group sales during the year ended June 30, 1960, established a record, states Mr. H. R. Hood Barrs, the chairman. Group net profit was £87,828 (£96,781), after tax of £64,089 (£36,898), and the dividend is raised to 35 (30) per cent. The group's financial position gives a very encouraging outlook for the company, Mr. Hood Barrs says.

GEORGE COHEN 600 GROUP, LIMITED—The company is to raise £3,000,000 by an issue of 5,000,000 5s. ordinary shares at 12s. each on a two-for-five basis to holders of November 1. The directors estimate that, subject to no unforeseen circumstances, the profits for the current year should be nearly the same as those for the previous year, in which event they will feel justified in maintaining the 13 per cent. total dividend.

R. & J. DICK, LIMITED, power transmission engineers, etc., of Glasgow—Dividend for the year ended August 31,1960 is raised to 35 (30) per cent. It is proposed to make a one-for-one scrip issue to ordinary holders and to issue three 4s. ordinary for every 20 6 per cent. 15s. preference shares. The latter issue is being made as compensation for a proposed alteration in voting and other rights. Group profits were £136,122 (£76,212), subject to tax of £65,054 (£32,836).

CHAMBERLIN & HILL, LIMITED, ironfounders, of Walsall (Staffs)—Turnover for the half-year to September 30 has been higher than that of the corresponding period of last year, the board states. The foundries are fully occupied and orders in hand should ensure the continuance of the high rate for the next three months. The interim dividend is raised to 7½ (6½) per cent. The increase has been made to equalize the two payments and does not indicate an increased total for the year.

BIRMID INDUSTRIES, LIMITED—The chairman, the Marquess of Exeter, reports that most of the group foundries were fully occupied during the year to July 31, 1960. The value of group sales was about 25 per cent. above 1958-59. Direct exports, consisting almost wholly of wrought light alloys, were substantially maintained, but competition in this field, particularly in northern Europe is "keener than ever." Group trading profits increased to £4,375,068 (£2,866,407).

METAL INDUSTRIES, LIMITED—Group profits, before tax, of £1,132,000 for the half-year to October 2 compare with £850,000 for the corresponding six months of 1959, prior to the acquisition of the Lancashire Dynamo group. The interim dividend of 6 per cent. (same) is paid on £7,475,123 (£4,140,338). Sir Charles Westlake, the chairman, sees no reason to change his £2,500,000 profit estimate for the year, made five months ago, "unless there is a major change for the worse in present economic conditions."

Growth of Tube Investments

TRADING profits of the Tube Investments, Limited, group increased by about 50 per cent. to £19,200,000. If allowance is made for the profits of the aluminium division—12 months this year compared with seven months last year—the comparable increase in profits was about 35 per cent. Sales, both home and overseas, increased by 20 per cent.

These details are given in the annual report by the chairman of Tube Investments, Sir Ivan Stedeford, who records that near capacity output from most of the group's plants throughout the 12 months carried sales of all types of steel tubes to the highest level in the history of TI. To keep abreast of the growing trend in the use of seamless tubes, the group is in the process of putting down an original type of plant for the continuous production of seamless carbon steel tubes and also other plant for the production of warm and cold extrusion of precision mild steel components.

Speaking of the future, Sir Ivan comments: "Whatever happens, British industry should strive to make the pace or, at the worst, keep up with events. Our prospects fundamentally depend on the speed and success with which technology and research can be harnessed to increase output and productivity and to lower production costs; and this largely depends on the scale and quality of new capital investment."

Good Results from Port Talbot's New Refinery

NEW benzole refinery of the Port Talbot Chemical Company, Limited, at Port Talbot started production ahead of schedule last month. Port Talbot Chemical Company is controlled by the Steel Company of Wales, Limited, and the Lincolnshire Chemical Company, Limited. Initial production from the new plant indicates that the quality of its products is well up to expectations.

Pure benzine, toluene, xylene, and naphthas, all of low sulphur content, exceptional colour stability, and all highly aromatic, are produced from crude benzol and coke oven gas from the SCOW coke ovens. The plant is the first of its kind in this country to produce pure benzine by hydrorefining, the unit for which was built from Lurgi designs by Simon-Carves, Limited. The distillation equipment was supplied by R. & J. Dempster, Limited, in conjunction with Lurgi and Port Talbot Chemical Company.

Increased Profits for J. Brockhouse

PROFITS of J. Brockhouse & Company, Limited, drop forgers, ironfounders, etc., of West Bromwich (Staffs), expanded less rapidly in the second half of the year ended September 30, 1960, than in the first half, nevertheless, group profit rose by 38 per cent. to £1,107,362 (£801,358), before tax of £544,094 (£416,163).

With capital profits of £104,420 (£57,859) and after tax and outside interests, the year's net balance is up from £472,329 to £679,501. Following the higher 4 (3) per cent. interim, the final dividend is increased from 7 per cent. to 8½ per cent.

NEWS IN BRIEF

PLANNING APPROVAL has been granted to a proposal of Colvilles, Limited, to build sales offices at a cost of £400,000 at Craigneuk (Lanarkshire).

BURGLAR-PROOF mortice lock which cannot be opened with skeleton keys has been announced by Chubb & Sons Lock & Safe Company, Limited.

APPLICATIONS in connection with an agreement between certain manufacturers of wire nails will come before the Restrictive Practices Court on Monday.

GEORGE DENHAM & COMPANY, LIMITED, engineers and ironfounders, of Low Mill Foundry, Darlington, is to move its works to Longfield Road, Darlington.

SOVIET production of steel and iron tubing has fallen well behind schedule and there is a considerable lag in the construction of plant capacity according to recent Soviet Press reports.

DUE TO THE credit squeeze and the inability to get sufficient work to make the machine shop economic or remunerative, the Plessey Company, Limited, is to lay off 350 workers next Friday.

"THE SELECTION OF STAFF" will provide the theme of a one-day conference of the British Institute of Management, to be held on November 29, at the Connaught Rooms, London, W.C.2.

THE British Institute of Management has established an annual award for the company making the best presentation of financial information to employees. Full details will be announced later.

Mr. T. NANCARROW, works manager, Steels Engineering Products, Limited, Sunderland, has been appointed works manager for Armstrong-Whitworth & Company (Pneumatic Tools), Limited, Tynemouth.

FIRST PART of an order for 22 precision grinding machines, each weighing about 4½ tons, made by the Churchill Machine Tool Company, Limited, Manchester, is being taken from Britain to Brno, Czechoslovakia, by road this week.

FACTORY of 8,800 sq. ft. has been leased at Shannon airport to a west German concern, controlled by Herr Willy Spee, Aachen. The factory will produce very fine wire gauze mesh from raw materials imported mainly from Germany.

AGREEMENTS with major oil importing companies are to be signed by South African Torbanite, Mining & Refining Company, Limited, under which it will process crude oil on their behalf to the full capacity of the Boksburg refinery.

CENTENARY of Qualter, Hall & Company, Limited, colliery and coke oven engineers, etc., of Barnsley (Yorks), is to be celebrated at a dinner on December 9 when each of the 277 employees will receive £1 for every year's service with the company.

ONE OF THE MAIN PROBLEMS of the European gas industry is how to harmonize supply and demand, and the economic considerations governing a gas tariff policy are dealt with in a survey prepared at the request of the *ad hoc* working party on gas problems, and published by the Economic Commission for Europe.

ANNOUNCEMENT was made by David Brown Industries, Limited, and EMI Electronics, Limited, on Wednesday, that their joint programme of research and development into the problems of applying electronic techniques to machine tools would be continuously expanded so as to use the full resources of both companies.

A NEW STORES at Kirkcaldy has been opened by British Insulated Callender's Cables, Limited. It has been specially set up to make immediately available a comprehensive range of rubber, thermoplastic and mineral insulated wiring cables for customers in the counties of Fife, Kinross, and Clackmannan. The telephone number is Kirkcaldy 3641.

SOLE REPRESENTATION for the promotion and sales in Britain of the "Airbrasive" cutting tool made by S. S. White Industrial Division, New York, has been awarded to Elliott Bros. (London), Limited, a member of the Elliott-Automation, Limited, group. The tool cuts or abrades almost any hard, brittle material by a controlled stream of gas-propelled abrasive.

CONTRIBUTION of £1,050 has been made by the United Steel Companies, Limited, to a home for old people which is to be built in Sheffield under the auspices of the Sheffield Council of Social Service. English Steel Corporation, Limited, Thomas Firth & John Brown, Limited, and Davy United Engineering Company, Limited, have each contributed £500.

THE Northern Regional Board for Industry has been asked by its Tees-side advisory committee to press for Government investigation of suspicions that Italian steel fabricators are receiving a hidden subsidy to help them to get oversea contracts. The matter has been raised by Mr. W. L. Fletcher, managing director of the Tees Side Bridge & Engineering Works, Limited.

AGREEMENT has been reached between Hawker Siddeley Nuclear Power Company, Limited, a member of the Hawker Siddeley Group, Limited, and Queen Mary College, University of London, to install the Jason Mark III reactor at the college's department of nuclear engineering. The Minister of Power has agreed the grant of a licence to the college to install the reactor.

A CONTINUOUS WIRE ROD MILL is being built by Schloemann, AG, Düsseldorf, for the Klöckner-Werke, AG, Hütte Haspe. The plant, which is scheduled for delivery in mid-1962, will comprise a roughing train consisting of eight stands, two intermediate trains each having four stands, and a finishing train with eight stands. Two shear lines are provided for cropping and for the emergency cutting of the material in motion.

SAFETY RECORD has been set up by the coil processing department at the Panteg works of Richard Thomas & Baldwins, Limited, which last month completed four consecutive years without a lost-time accident. Two other departments at the works also set up new records in October—the merchant mill completing 600 days without a lost-time accident and the arc furnaces also approaching the 600-day mark.

INDIAN DELEGATION of 10 senior industrial executives, technicians, Government officials, and workers' representatives visited the Margam works of the Steel Company of Wales, Limited, on Monday. The delegation is visiting various industrial centres in Germany, the UK, US, and Japan, to study modern methods of materials handling and the South Wales visit was arranged by the South Wales Division of the Institute of Materials Handling.

INVESTIGATING COMPLAINTS that the noise of the forge hammers of George Senior & Sons, Limited, Sheffield, was keeping nearby residents awake at night, Mr. F. Mulley, the local MP, spent Saturday night in an adjoining block of flats. He said in the morning that residents had a genuine grievance and that he would raise the matter in the House of Commons. The company ran a special night shift of three of its noisiest hammers to help with the test.

Board Changes

Sir Aubrey Burke Joins Dosco

CHAIRMAN and managing director of the de Havilland Aircraft Company, Limited, Sir Aubrey Burke, has been elected an additional director of the DOMINION COAL COMPANY, LIMITED, a subsidiary of the Dominion Steel & Coal Corporation, Limited, of Canada. He is on the board of a number of the de Havilland subsidiary companies and is deputy managing director of the parent, Hawker-Siddeley Group, Limited.

In April, Sir Aubrey joined the board of A. V. Roe Canada, Limited, and when de Havilland, in conjunction with the American Bosch Arma Corporation, acquired S. G. Brown, Limited, Sir Aubrey became chairman of the latter company.

GLOUCESTER RAILWAY CARRIAGE & WAGON COMPANY, LIMITED—Mr. J. W. Buckley has joined the board and been appointed chairman.

JOSEPH LUCAS (SALES & SERVICE), LIMITED—Mr. R. F. Groves has been appointed service director in place of Mr. F. E. J. Brown who has retired.

ROBERT BOBY, LIMITED—Mr. R. F. W. Keay, works manager of Vickers-Armstrongs (Engineers), Limited, has joined the board of the company, another member of the Vickers group.

G. & J. HALL, LIMITED—Mr. Reginald S. Bruce, president of Sheffield Chamber of Commerce, has resigned as managing director. Mr. R. Hulley, chairman, is taking over as managing director.

METAL INDUSTRIES, LIMITED—Mr. P. Jardine, group financial controller, has been appointed to the boards of two of the subsidiaries, J. G. Statter & Company, Limited, and Minerva Mouldings, Limited.

WILLIAM FOSTER & COMPANY, LIMITED—Mr. William K. G. Allen has been appointed a director and chairman on the resignation of Mr. C. V. Armitage. Mr. E. Broughton, Mr. William Jeffries, and Mr. H. N. G. Allen have joined the board.

BRIGHTSIDE ENGINEERING HOLDINGS, LIMITED—Mr. Tom C. Firth, chairman, has been appointed managing director. Mr. Ambrose Firth, who has retired as joint managing director after 45 years with the group, continues as a member of the board. He retired from the chairmanship in June.

ENGINEERING & LIGHTING EQUIPMENT COMPANY, LIMITED—Following the death of the Earl of Verulam the board has been constructed as follows:—Chairman and managing director, Mr. H. G. Houghton; deputy managing director, Mr. F. Webster; Mr. C. S. K. Benham; Mr. C. G. Maynard; and Mr. R. Proctor, who is also secretary.

M-O VALVE COMPANY, LIMITED—Mr. G. A. Marriott, managing director of the company which is a wholly-owned subsidiary of the General Electric Company, Limited, is to retire next March. He will be succeeded by Mr. J. Bell who is at present deputy director and manager of GEC research laboratories and a member of the M-O Valve board.

BARROW IRONWORKS, LIMITED—Mr. D. R. Wattleworth has been appointed to the board. He was formerly a director of Workington Iron & Steel Company, branch of the United Steel Companies, Limited, and its subsidiary companies, and at the time of his retirement from Workington was general works manager. He is at present a director of Hornflowa, Limited, and Bothel Lime & Limestone Company, Limited.

SOLARTRON ELECTRONIC GROUP, LIMITED—Mr. Eric E. Jones, commercial director, is leaving to become managing director of Adrema (Holdings), Limited, and its subsidiaries, including the Bradma companies. He will at the same time become European vice-president of the Farrington Manufacturing Company, USA, the parent company of Adrema (Holdings).

STEEL & COMPANY, LIMITED—Mr. T. A. Otterson, managing director of the subsidiary, Archibald Low & Sons, Limited, has relinquished that position to become head of the organization and methods department of the group. He is succeeded by Mr. R. C. Hockey, who recently resigned as director and general manager of Blackburn (Dumbarton), Limited, a subsidiary of Blackburn & General Aircraft, Limited.

PIRELLI, LIMITED—Sir Gerard Clauson has become chairman in succession to Mr. Peter Thoneycroft, who resigned in July last on his appointment as Minister of Aviation. Sir Gerard joined the board in 1953 and is also a director of Pirelli-General Cable Works, Limited. He was Assistant Under-Secretary of State from 1940 until his retirement and was chairman of the International Rubber Conference in 1951.

Staff Appointments at Ebbw Vale Works of RTB

NEW staff appointments at the Ebbw Vale works of Richard Thomas & Baldwins, Limited, have been announced. Mr. W. Brown, education and welfare officer, has been appointed manager of the personnel department in place of Mr. Eugene Cross who has given up active duties but will continue to serve the company in a consultative capacity.

Mr. D. I. Mills has been appointed section chief education officer and Mr. J. R. Yabsley the new section welfare officer.

Minister to Report on Coal's Future

PROSPECTS of coal in relation to oil and other fuels up to 1965 is to be the subject of a paper which Mr. Richard Wood, the Minister of Power, has said he will have drawn up. He gave the undertaking at a meeting of the National Production Advisory Council in London last Friday, following a request by Mr. Will Paynter, general secretary of the National Union of Mineworkers.

Mr. Niall MacPherson, Parliamentary Secretary to the Board of Trade, told the council that the fact that the car industry was tending to hold on to its manpower and was not giving up its plans for investment, showed its confidence in the future. On the future of industry generally, Mr. Selwyn Lloyd, Chancellor of the Exchquer, reiterated his view that the problems of the 1960s were going to be more difficult than those of the 1950s. Both the fall in exports and investment programmes were very worrying in the present position, he said.

FITTER Mr. Edward Parker Atkinson, who claimed £400 damages against the Wallsend Slipway & Engineering Company, Limited, had his claim disallowed by Judge Drabble in Newcastle-upon-Tyne County Court. He claimed that he had suffered a hernia while working in unsatisfactory conditions.

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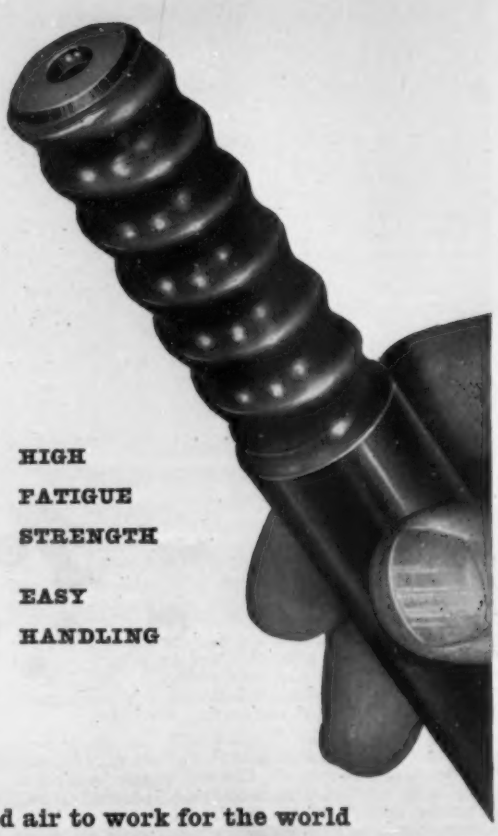

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ECSC Co-operation on New Steel Plants

ERECTION of a giant steel producing plant near the Belgian coast is being considered by Arbed, of Luxembourg, in association with Cockerill-Ougrée, of Belgium, and Schneider (Le Creusot), of France. It will be a "vertical unit" producing from the blast-furnace stage up to finished rolled products, notably thin cold-rolled plates.

M. Felix Chomé, chairman of Arbed, said that the plant would have a capacity of 2,000,000 to 2,500,000 tons of steel ingots a year. He also hinted at the participation of an American company in the scheme.

Some $30,000,000 of the $35,000,000 loan which the High Authority of the European Coal and Steel Community recently raised on the American market has been allocated to various new steel projects. The largest share—$19,000,000—has gone to Usinor, of France, for work on the Dunkirk steel plant, which is due to start production in 1962. The Italian company, Finsider, has obtained $7,700,000 for its steel plant at Taranto.

Shipbuilding Unions' Concern Over Depressed Industries

FEAR that Tyne shipyards will lose the chance of converting 11 oil tankers into grain and ore carriers unless the month-old pay dispute is settled, has been expressed by the Confederation of Shipbuilding and Engineering Unions. It is to meet the Shipbuilding Employers' Federation on Thursday to see what can be done to save the £4,000,000-worth of work for the depressed industry.

The confederation is also seeking talks with the motor manufacturers to discuss whether, in view of the recession in the industry, there is any point at present in proceeding with plans to build new factories in Scotland, Wales, and on the Merseyside. Mr. J. Matthews, president of the confederation, said that with the profits the motor industry had made it could well afford to keep the men who had been declared redundant in work until after Christmas.

US Costing Association Sets Up UK Branch

BRITISH group of the American Association of Cost Engineers has been established, with the same objectives as the parent organization. These are to advance the science and art of cost engineering through reports, discussions in forums, and publications, and to promote a standardization of terminology and methods as far as possible.

The association defines cost engineering as the application of scientific principles and techniques to cost estimation, control, and profitability. It aims to encourage the inclusion of instruction in such application in the standard engineering curricula.

WHEN THE POWER-STATION BUILDING at Newman Spinney, near Barlborough, Chesterfield (Derbyshire), is demolished next month, measuring instruments will gauge the strength of the special concrete used in its construction. In mixing the concrete, waste ash from power stations was used instead of sand.

Redundancies Follow Car Industry Slump

SLUMP in the motor industry is having repercussions among many dependent industries. The Pressed Steel Company, Limited, is to make one in four of its labour force—1,100 men—redundant over the next four weeks and even then a substantial amount of short time will have to be worked. At the Oxford factory about 200 workers have already been paid off and 500 more are to leave in the next month.

Another firm of sheet metal workers, Willenhall Motor Radiator Company, Limited, laid off 300 workers this week, although there is a possibility of early reinstatement if strike troubles at BMC are cleared up soon.

Qualcast, Limited, Derby, which produces engine and other castings, had been forced to serve notice on 100 of its workers during the last five weeks, although the factory is at present maintaining a five-day week with reduced overtime.

RUSSIA WANTS BRITISH MACHINE-TOOLS

IMPORTANCE of British exhibitors in the Moscow Trade Fair showing a good selection of advanced machine tools has been stressed by Soviet officials organizing the exhibition. They believe that the £300,000 worth of British machine tools sold in the USSR in the first nine months of this year represents only a fraction of the potential market. Mr. A. M. Goryachev, of the exhibition section of the Soviet Chamber of Commerce, said that provided exhibitors displayed such equipment, excellent business could be done on the spot.

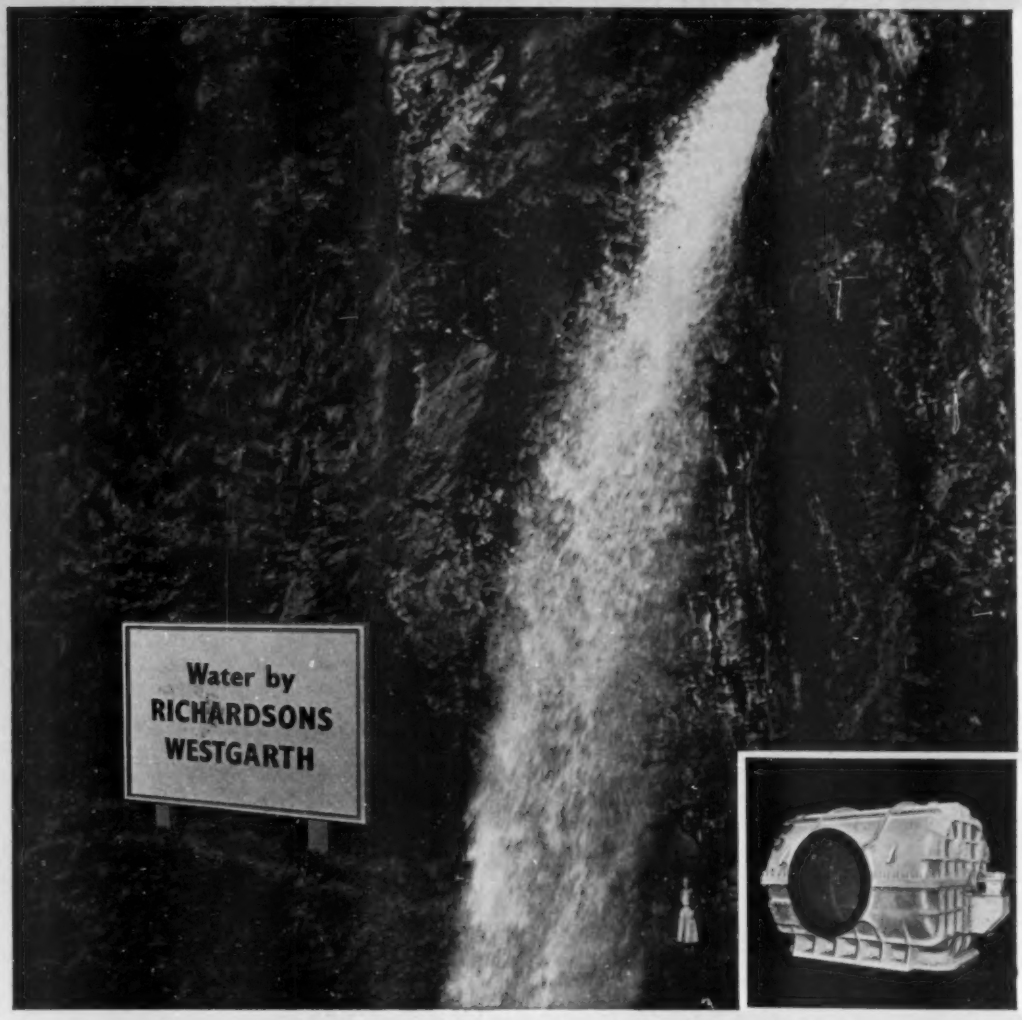
He expressed the view that the exhibition, and the complementary Russian Exhibition in London, should be aimed at stimulating long-term trade. There are particular opportunities in the field of specialized machine tools normally produced in small numbers, since Russian machine-tool production is geared to mass production.

Vactric to be Wound Up

ORDER was made in the Chancery Division by Mr. Justice Pennycuick on Monday for the compulsory winding-up of Vactric, Limited, manufacturers of electric appliances, precision tools, etc. Mr. L. C. Morris Smith, for the company, asked for a three-week adjournment on the ground that the company's statement of affairs was likely to be completed within that time. "It should disclose a position on which proposals may be based for the unsecured creditors—proposals either for a composition or a moratorium which would produce more benefits for them and the company than a winding-up order," he said.

The judge refused counsel permission to appear out of time for three wholly-owned subsidiaries of Vactric, creditors for an aggregate of £390,000, who wished to oppose the petition.

SALES of Associated Spring Corporation, Bristol, Connecticut, for the first nine months of the year were 11 per cent. below those of the corresponding period of 1959. Net profit for the period was $498,771 ($1,457,370).



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QUALIFIED MINING ENGINEER, aged 35, employed during the last year by a nationalised industry in the capacity of first class mug at a new development colliery in the North West of England, seeks position where hard work unlike virtue carries a more suitable reward. Box QM359, IRON AND COAL TRADES REVIEW.

UNDERMANAGER, aged 29 years, Hons. Degree, 1st Class Certificate, A.M.I.Min.E., eight years' industrial experience, seeks position with manufacturers of mining equipment, or other suitable employer. Box UA355, IRON AND COAL TRADES REVIEW.

MINING ENGINEER, aged 25 years, Hons. degree, 1st Class (Mine Manager's) Certificate, A.M.I.Min.E., with three years' post graduate management training, requires position in production, with consulting concern or lecturing. Box ME362, IRON AND COAL TRADES REVIEW.

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SALES REPRESENTATIVE required for the South Western Division of the N.C.B. (Welsh speaking preferred but not essential) by a firm manufacturing Hydraulic Tools and Roof Supports. Applicants must have a practical knowledge of mechanics, hydraulics and also mining experience in connection with Roof Support Systems. Age—not above 40 years. Write giving full information concerning experience, salary required, etc. Car provided. Apply Box SR358, IRON AND COAL TRADES REVIEW.

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Applications, which will be treated in strict confidence, should in the first place set out brief details of qualifications and career to date and be addressed to the

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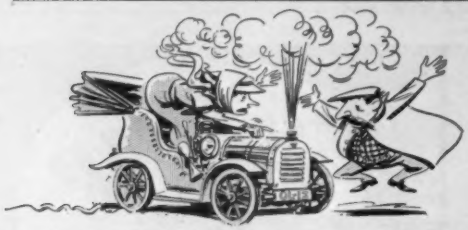

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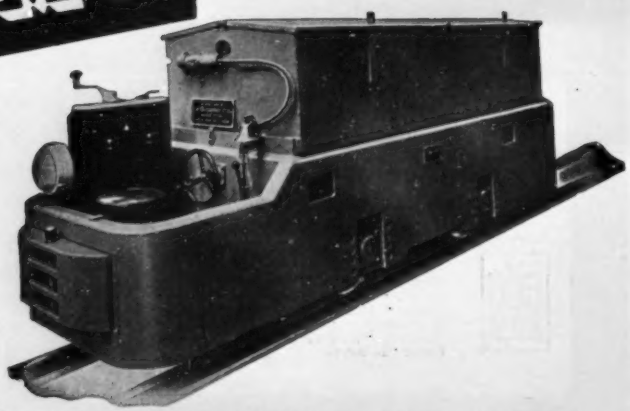

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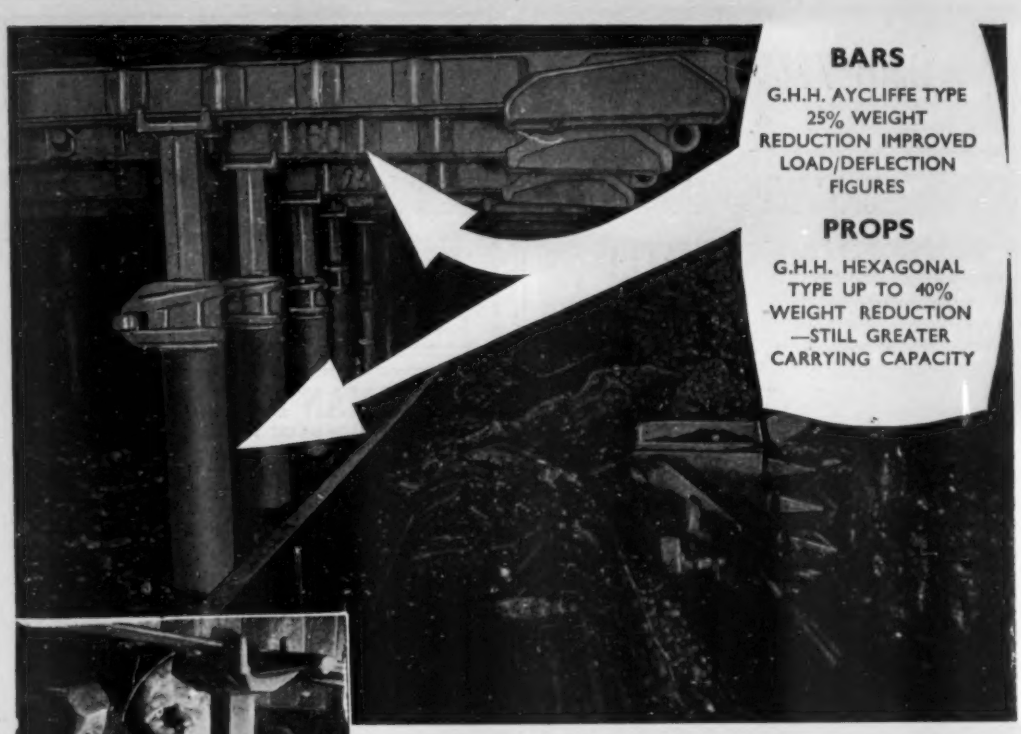

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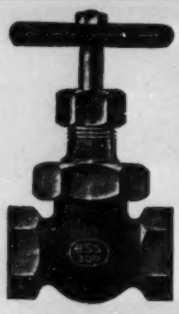

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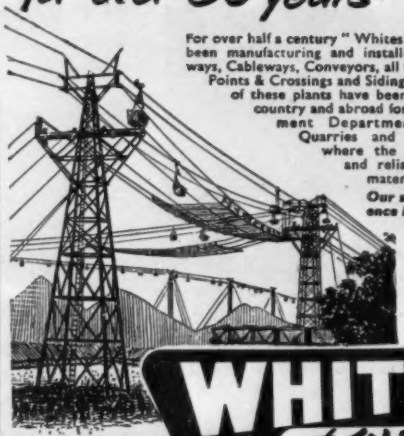

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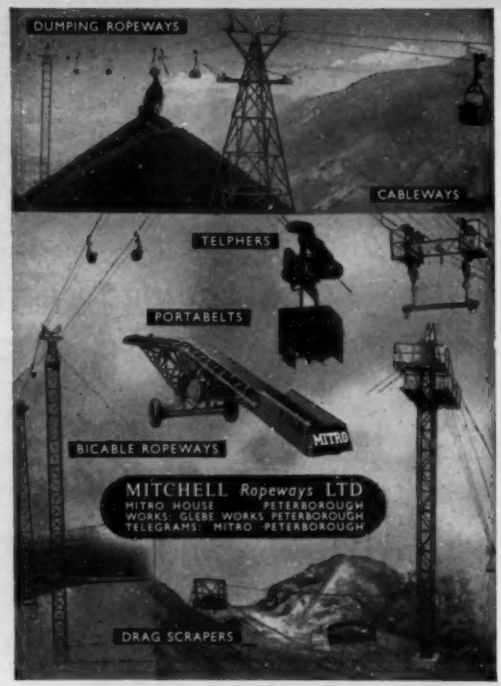

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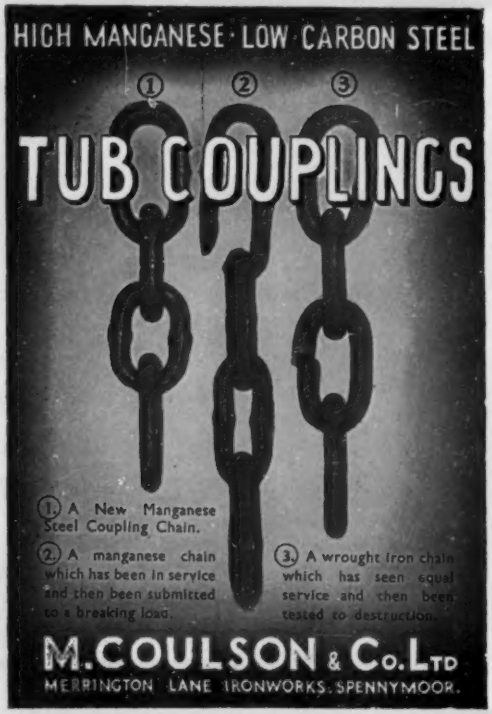
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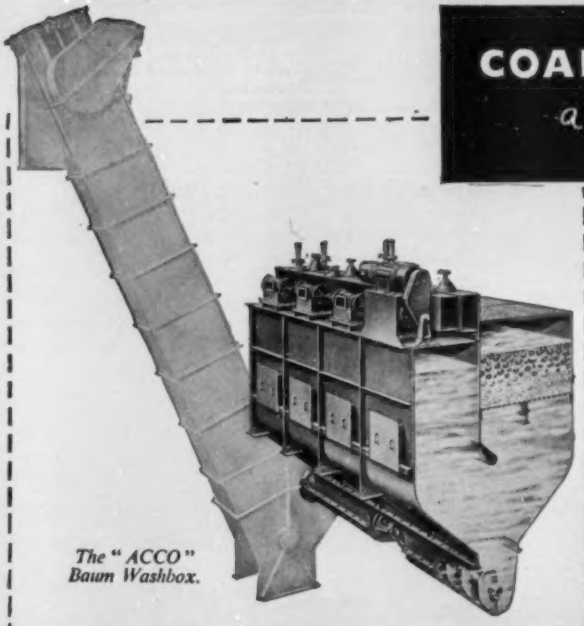

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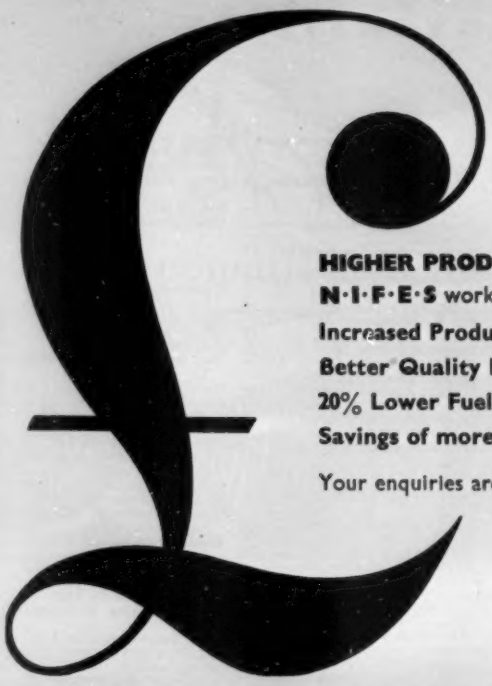

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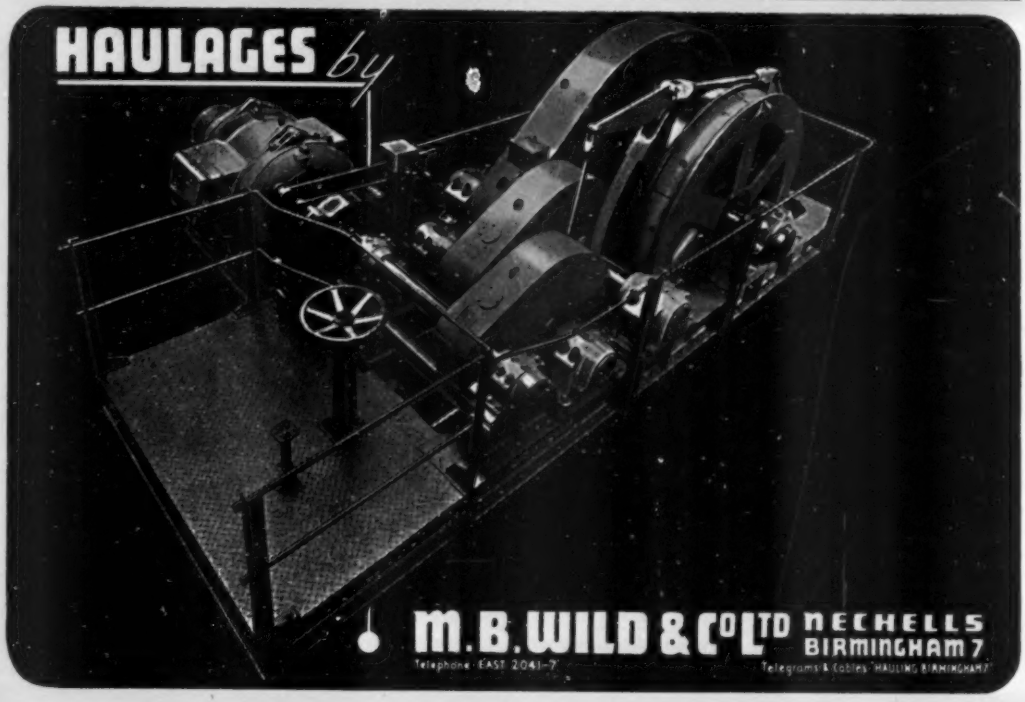

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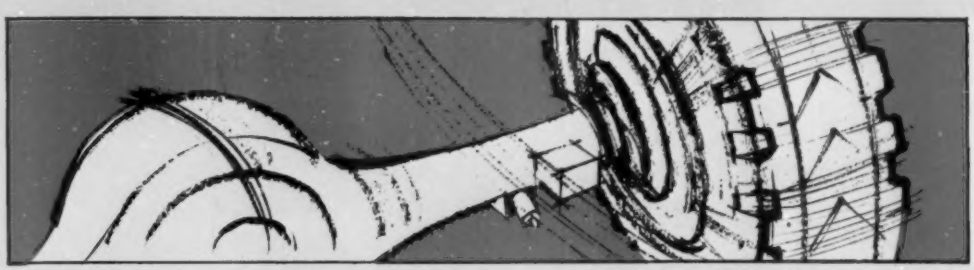

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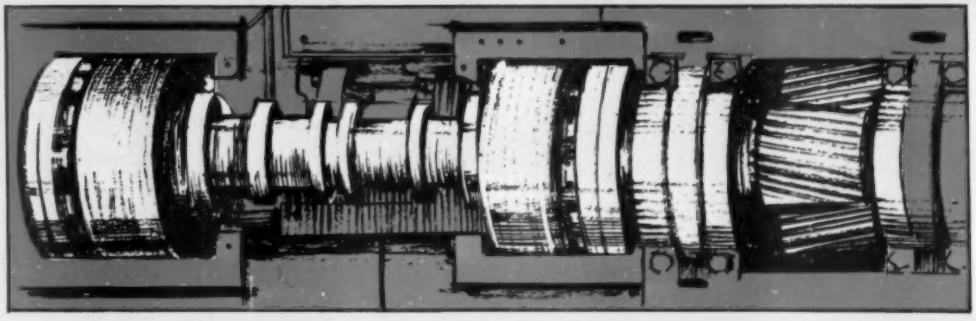

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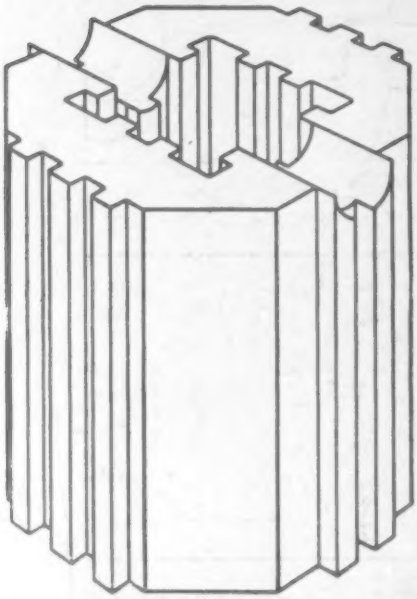

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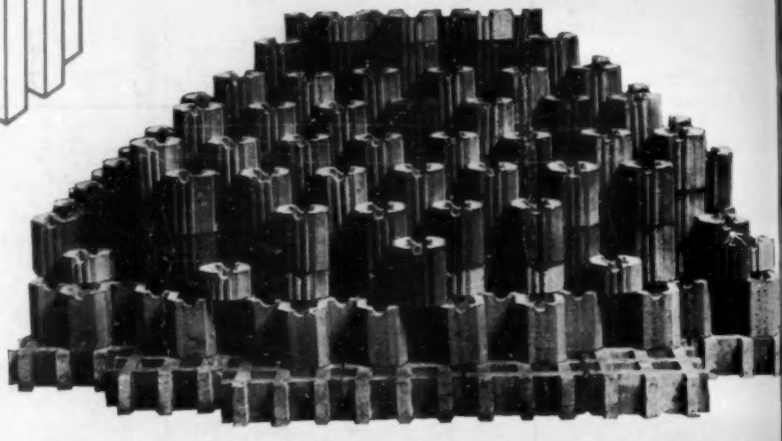

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